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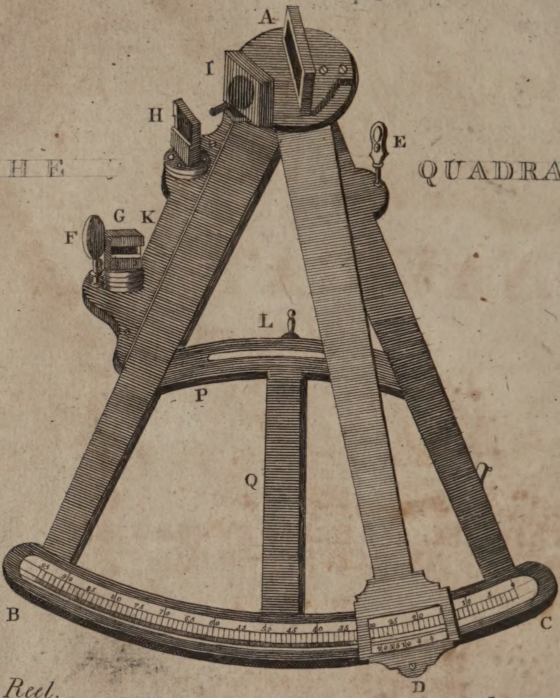

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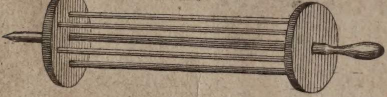

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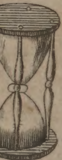

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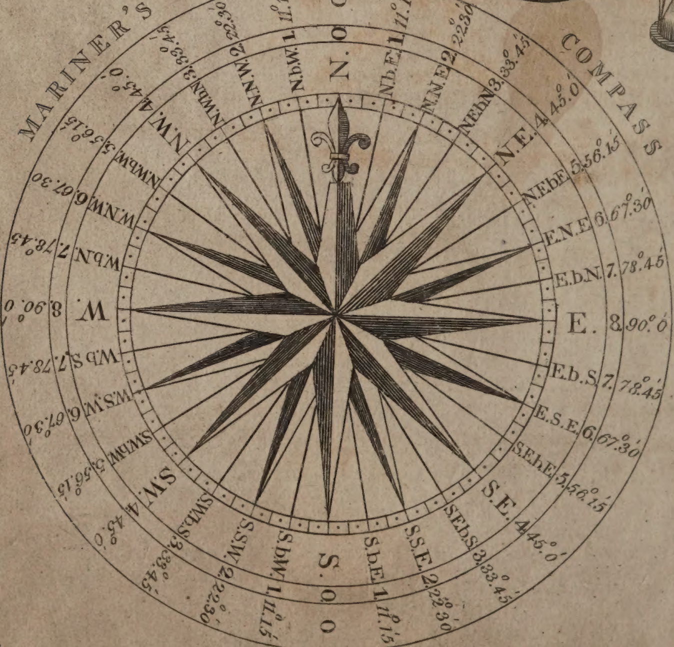

DABOLL'S
PRACTICAL NAVIGATOR:

BEING A
CONCISE, EASY, AND COMPREHENSIVE
SYSTEM OF

NAVIGATION;

CALCULATED FOR THE
DAILY USE OF SEAMEN,
AND ALSO FOR
AN ASSISTANT TO THE TEACHER:
CONTAINING
PLANE, TRAVERSE, PARALLEL, MIDDLE LATITUDE, AND
MERCATOR'S SAILING;
WITH ALL THE
NECESSARY TABLES.
CONCISE RULES ARE GIVEN, WITH A VARIETY OF EXAMPLES
IN EVERY PART OF
COMMON NAVIGATION;
ALSO,
A NEW, SCIENTIFIC, AND VERY SHORT METHOD OF CORRECTING THE
DEAD RECKONING;
WITH RULES FOR KEEPING A COMPLETE RECKONING AT SEA,
APPLIED TO PRACTICE, AND EXEMPLIFIED IN THREE SEPARATE
JOURNALS,
IN WHICH MAY BE SEEN ALL THE VARIETIES WHICH CAN PROBABLY
HAPPEN IN A
SHIP'S RECKONING.

BY NATHAN DABOLL,
Late Teacher of Mathematicks and Astronomy, in Plainfield Academy;
Author of a System of Arithmetick, and Teacher of Navigation.

NEW-LONDON, (CON.)
PRINTED AND SOLD BY SAMUEL GREEN.
1820.

District of Connecticut, ss.

****
*   L. S.   *
****

BE IT REMEMBERED; That on the twenty-sixth day of July, in the forty second year of the Independence of the United States of America, SAMUEL GREEN, of the said District, deposited in this office the title of a Book, the right whereof he claims as proprietor, in the words following, to wit:

"Daboll's Practical Navigator, being a concise, easy, and comprehensive system of Navigation, calculated for the daily use of Seamen, and also for an Assistant to the Teacher; containing Plane, Traverse, Parallel, Middle Latitude, and Mercator's Sailing; with all the Necessary Tables. Concise Rules are given, with a variety of examples in every part of Common Navigation. Also, a new, scientific and very short method of correcting the Dead Reckoning; with rules for keeping a complete reckoning at sea, applied to practice, and exemplified in three separate Journals, in which may be seen all the varieties which can probably happen in a ship's reckoning. By NATHAN DABOLL, late Teacher of Mathematicks and Astronomy in Plainfield Academy; author of a system of Arithmetick, and Teacher of Navigation."

In conformity to the Act of the Congress of the United States, entitled "An act for the encouragement of learning, by securing the copies of Maps, Charts, and Books, to the Authors and Proprietors of such copies, during the times therein mentioned."

R. I. INGERSOLL,
Clerk of the District of Connecticut.

A true copy of Record, examined and sealed by me.

R. I. INGERSOLL,
Clerk of the District of Connecticut.

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1820

PREFACE.

THE design of this work is, not only to furnish seamen in general, with a NEW, PRACTICAL, DAILY ASSISTANT, but, also, the teacher in his school, with a plain system of PRACTICAL NAVIGATION, calculated and fitted for his purpose ; in which the rules are intended to be concise and clear, with a variety of examples, serving to assist the learner in becoming expert in practice. Navigation is here considered and taught as an art, that may be easily acquired by any common capacity ; in which the problems are all *resolved by inspection ;* which is well known to be the common mode of practice at sea, and fully sufficient to answer any purpose in common Navigation.

Many of our best, and most valuable seamen, who spend the early part of their days at sea, in acquiring seamanship and the management of a vessel, have had little or no opportunity of learning Mathematicks, although they may be capable and intelligent in business, being generally exercised in their occupation, especially about the time they want to learn Navigation.

To enjoin it upon them to learn, in the first instance, the whole *theory* of Navigation, perhaps in a short time too, might prove to be incompatible with their future advantage and success, as it would probably discourage them, and be the means of their never learning it at all. Yet these men, who are complete in seamanship, and well skilled in the practical management of a vessel at sea, (which indeed, is ever acknowledged to be the most important part of the mariner's duty) would readily pursue practical Navigation, with care and assiduity, and soon become ready and expert in all practical operations, necessary in common Navigation, which might render them truly useful to their country, their employers, and themselves.

This book is a concise, easy system of Practical Navigation, not only for the use of seamen in general, but also will be a profitable exercise book, even for those who are well versed in the theory of Navigation, by affording them a variety of questions in each Case, so that by working many examples, they may become complete Practical Navigators.

After noticing a few particulars, the reader is referred to the contents.

In PLANE SAILING, I have given a number of examples in each Case, in order that the learner may become expert in the use of the Tables.

In TRAVERSE, PARALLEL, MIDDLE LATITUDE, and MERCATOR'S SAILING, the rules are concise, clear, and sufficiently exemplified.

Since the principal object of Middle Latitude Sailing, is merely to reduce the departure, or Meridional distance, to difference of Longitude, and difference of Longitude to departure; I have not burdened the learner with ten or twelve operations, calling them Cases in Middle Latitude, as most authors have done; as the use of Middle Latitude and Mercator's Sailing, is principally included in the solution of two problems, viz. Shaping of Courses, and finding the difference of Longitude on Globular principles. I have therefore made out two Cases in each, and exemplified them with a variety of questions, that the learner may soon become a proficient in the most useful and necessary rules.

I have likewise given a *new, concise, and easy method of correcting the Dead Reckoning*, for averaging an error made in either the course or distance, or in both, never before published; being founded on the strictest principles of science;—and have also given an explanation and demonstration of this new method, which was discovered by the author of this work in the year 1799; which method he has ever since practised, instead of the operose, absurd, and erroneous Rules published by Robertson, Hamilton Moore, and others.

The art of keeping a complete Reckoning at Sea, is a most necessary and valuable acquirement, for which the mariner ought to be completely furnished. I have illustrated and exemplified three Journals, that the learner may, by sufficient exercise and practice, become complete in this essential part of Navigation.

Tables of Logarithms, of Artificial Sines, Tangents and Secants, and of Proportional Logarithms are here omitted, to avoid swelling this work, and, as they are to be found in all the oldest writers upon Navigation.

The necessary Tables are noticed in the Table of Contents.

Table IX contains the Sun's declination, which was carefully compared with Nautical Almanacks, and marked to the nearest minute.

This work, being chiefly the result of my long experience in actual teaching, is respectfully submitted to the candid public, and especially to the *Practical Mariner*, for whose use and benefit it is principally designed.

N. DABOLL.

ADVERTISEMENT.

THE Proprietor has regretted the delay in the publication of this work. This has arisen principally from the sickness and death of the author, Nathan Daboll, Senior; the copy requiring corrections, which his state of health prevented his making before his decease. It hence became necessary to obtain the aid of some scientific friends, in correcting and preparing the work for the press.

It is now submitted to the public, with a confidence that it will meet the expectations of the *numerous masters of vessels and seamen*, who recollect the remarkable clearness and facility with which the author taught them Navigation.

As, in a work of this kind, some errors may have escaped notice; if any be discovered, it is requested they may be communicated to the public's

Obedient Servant.

SAMUEL GREEN.

New-London, April 17, 1820.

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II. Difference of Latitude and Departure for Degrees.
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V. Depression or Dip of the Horizon.
VI. The Sun's Parallax in Altitude.
VII. Moon's Augmentation.
VIII. Dip of the sea at different distances from the observer.
IX. Sun's Declination.
X. For reducing the sun's declination at Greenwich, to any other meridian.
XI. The Sun's Right Ascension.
XI. Right Ascension, Declination, and Annual Variations of Fixed Stars.
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XVII. For reducing Longitude into Time, and the contrary.
XVIII. For finding the distance of Terrestrial Objects at sea.
XIX. Latitudes and Longitudes of places.

Explanation of Characters and Abbreviations.

$=$ *Equal to*, as $12d. = 1s.$ signifies that 12 pence are equal to one shilling.

$+$ *More*, the sign of addition, as $5+7=12$, signifies that 5 and 7 added together are equal to 12.

$-$ *Minus*, or *less*, the sign of subtraction, as $6-2=4$, signifies that 2 subtracted from 6 leaves 4.

$\times$ The sign of multiplication, $4\times3=12$, signifies that 4 multiplied by 3, is equal to 12.

$\div$ The sign of division, as $8\div2=4$, signifies that 8 divided by 2, is equal to 4; or thus, $\frac{8}{2}=4$, each of which signify the same thing.

: : Four points set in the middle of four numbers, denote them to be proportional to one another, by the rule of three; as $2:4::8:16$, that is as 2 is to 4, so is 8 to 16.

° Signifies Degrees; thus, 45° represent 45 degrees.

′ or m. Signifies Minutes; thus, $24'$, or 24 minutes.

″ or s. Signifies Seconds; thus, $44''$, or 44 seconds.

‴ or t. Signifies Thirds; thus, $22'''$, or 22 thirds.

S. Signifies Sine.

Sec. Signifies Secant.

Tan. Signifies Tangent.

Each of these last with Co. before it, signifies the complement, as Co-sine, Co-tangent, Co-secant.

☉ The Sun ☽ the Moon. ∗ a Star. L. L. Lower Limb. U. L. Upper Limb. N. L. Nearest Limb. S. D. Semidiameter. N. A. Nautical Almanack. Z. D. Zenith Distance. D. R. Dead Reckoning. M. P. Meridional Parts. M. D. L. Meridional Difference of Latitude.

DECIMAL FRACTIONS.

FRACTIONS are expressions for any assignable part of an unit, or whole number. A *Vulgar Fraction* is represented by two numbers placed one above the other, with a line drawn between them, thus, $\frac{3}{4}$, $\frac{5}{8}$, &c. signifies three fourths, five eighths, &c. The figure above the line, is called the numerator, and that below it, the denominator,

Thus, $\left\{\begin{array}{l}5 \text{ Numerator,} \\ \overline{8} \text{ Denominator.}\end{array}\right.$

A *Decimal Fraction* is that whose denominator is an unit, with a cipher, or ciphers annexed to it, Thus, $\frac{4}{10}$, $\frac{5}{100}$, $\frac{45}{1000}$, &c. &c. consequently, the denominator of the fraction will always be 10, 100, 1000, 10000, &c. which being understood, need not be expressed, for the true value of the fraction may be expressed by writing the numerators only, with a point before it on the left hand; thus, $\frac{5}{10}$, is written .5 ; $\frac{45}{100}$ .45 ; $\frac{725}{1000}$ .725, &c.

In setting down a decimal fraction, without the denominator, the numerator must consist of as many places as there are ciphers in the denominator, and if there be not so many, the defect must be supplied by setting ciphers before them ; thus, $\frac{3}{10}$ is .3, $\frac{16}{100}$ is .16, but $\frac{14}{1000}$ is .014, and $\frac{5}{1000}$ is .005.

Each decimal figure takes its value from its distance from the unit's place ; if it be on the first place on the right hand of the point, it is so many tenths ; if in the second, so many hundredths, and if in the third place, so many thousandths, &c. decreasing in each place in a tenfold proportion, from the left hand towards the right.

ADDITION AND SUBTRACTION OF DECIMALS.

RULE.

These are performed exactly the same as in whole numbers, observing always to place the decimal points in a line, so that figures of the same denomination may range under each other.

EXAMPLES IN ADDITION.

.5	53.2	65.	720.1464
.75	79.46	246.3	39.
.253	2.304	19.24	7.246
.582	127.4	221.46	259.1703
2.085	262.364	552.00	1025.5627

EXAMPLES IN SUBTRACTION.

.75	246.25	174.	176.014	1.000
.5	19.5	2.561	29.008	.009
.25	226.75	171.439	147.006	0.991

MULTIPLICATION OF DECIMALS.

RULE.

Multiply the given numbers together, as if they were whole numbers, and point off as many decimals in the product, counting from the right hand, as there are decimal places in both the factors; and if there be not so many places in the product, supply the defect, by prefixing ciphers on the left hand.

EXAMPLES.

.25 Multiplicand.	3.275	.2376	25
.42 Multiplier.	29.5	.0062	.25
50	16375	4752	125
100	29475	14256	50
	6550		
.1050 Product.		.00147312	6.25
	96.6125		

DIVISION OF DECIMALS.

RULE.

Divide as in whole numbers, and from the right hand of the quotient, point off so many places for decimals, as the decimal places in the dividend exceed those in the divisor. But if the places in the quotient be not so many as the rule requires, supply the defect by prefixing ciphers to the left hand of said quotient.

EXAMPLES.

9.51)77.4114(8.14	3.8).21318(.0561.	Divide 9.6 by .06
76 08	190	.06)9.60(
1 331	231	160, Ans.
951	228	
3804	38	
3804	38	

4. Divide 14.625, by 3.25	*Ans.* 4.5
5. Divide 0.35 by 0.7	*Ans.* .5
6. Divide .45695 by 12.5	*Ans.* .0365
7. Divide 2.30000 by 96.	*Ans.* .02395

REDUCTION OF DECIMALS.

To reduce a Vulgar Fraction to its equivalent Decimal.

RULE.

Add ciphers at pleasure to the numerator, and divide by the denominator; the quotient will be the decimal fraction required, by pointing off from the right hand of the said quotient just so many places, or figures, as you annexed ciphers to the numerator, and if there be not so many in the quotient, make up the deficiency by placing ciphers on the left hand of the said quotient.

EXAMPLES.

1. Reduce $\frac{1}{8}$ to a decimal.
8)1.000

.125 *Ans.*

2. Reduce $\frac{17}{20}$ to a decimal.
20)17.00

.85 *Ans.*

3. What decimal is equal to $\frac{1}{27}$? *Ans.* .037037—

4. Reduce $\frac{9}{1125}$ to its equivalent decimal. *Ans.* 008

To find the value of a decimal in the known parts of the integer.

RULE.

1. Multiply the decimal by the number of parts in the next less denomination, and cut off so many places for a remainder, to the right hand, as there are places in the given decimal.

2. Multiply the remainder by the next inferior denomination, and cut off a remainder as before; and so on through all the parts of the integer, and the several denominations standing on the left hand, make the answer.

EXAMPLES.

1. Required the value of .35 of a degree.

$$\begin{array}{r} .35 \\ 60 \\ \hline \text{Min. } 21.00 \end{array}$$ *Ans.*

2. Required the value of .75 of a mile.

$$\begin{array}{r} .75 \\ 8 \\ \hline \text{Furlongs } 6.00 \end{array}$$

A BRIEF

INTRODUCTION

TO

NAVIGATION.

BEFORE we begin Navigation, it is proper to form some correct ideas of the Solar System.

Astronomers of the present day agree in opinion, that the Universe is composed of a multitude of Systems, or Worlds; even as many as there are fixed stars in the heavens; that every star is a sun placed in, or near the centre of its own proper system, having planets, or worlds revolving round it, as our sun has.

The system in which our earth, and all the planets (known to us) are placed, is called the *Solar System*, because the sun, that great fountain of light and heat, is supposed to be fixed near the centre. These planets revolve around the sun in their respective orbits, at different distances and periods of time.

The earth revolves around the sun once a year, which brings the various seasons, viz. Spring, Summer, Autumn, and Winter. Besides, the earth revolves around its axis from west to east every twenty-four hours, which causes the sun, moon, and planets apparently to rise and set, and, is evidently the cause of day and night.

The earth is attended by a satellite, called the moon, whose diameter is 2180 miles; her distance from the centre of the earth is 240,000 miles. She revolves around the earth, from west to east, in about 29½ days, from one change to another.

There are in our Solar System, besides the moon, eleven Planets, or Worlds, which revolve around the sun, in their respective orbits, at different distances. Their names, magnitudes, distances from the sun, periodical revolutions, diurnal rotations, and number of satellites, are exhibited in the following Table.

A TABLE OF THE SOLAR SYSTEM,

From the most modern and approved Authors.

Sun and Planets.	*Diam. in miles.*	*Distance from the Sun.*	*Time of revolv. round the sun.*			*Diurnal rotation.*			*Satellites.*
			Days.	*h.*	*m.*	*d.*	*h.*	*m.*	
☉ Sun	883,246	*miles.*	. . . .			25	14	8	
☿ Mercury	3,224	37,000,000	87	23	16	unknown.			
♀ Venus	7,687	68,000,000	224	16	50		23	25	
⊕ Earth	7,928	95,000,000	365	5	49		23	56	*1
☽ Moon	2,180	95,000,000	365	5	49	27	7	43	
♂ Mars	4,189	144,000.000	686	23	30	1	00	39	
* Vesta†	unknown.	207,000,000	1,161	00	00	unknown.			
* Juno	119	286,000,000	1,587	00	00	unknown.			
* Pallas	110	267,000,000	1,683	00	00	nnknown.			
✱ Ceres	160	264,000,000	1,617	00	00	unknown.			
♃ Jupiter	89,170	490,000,000	4,332	14	26		9	56	4
♄ Saturn	79,042	900,000,000	10,759	1	51		10	16	7
♅ Herschel	35,112	1,800,000,000	30,737	18	00	unknown.			6

Having given a cursory view of the Solar System, we shall now be more particular respecting the figure and motion of the earth, with various imaginary lines upon it.

That the earth, or planet on which we live is round, or nearly so, will appear, not only from the circular shadow it casts upon the moon, when eclipsed, but also from the appearance of objects at sea ; for when a ship is making towards the land, the mariners first descry the tops of mountains, steeples, &c. pointing above the water ; the lower parts being hid, by reason of the curvature of the earth.

In order to describe the situation and position of places, Geographers have found it necessary to imagine various lines and circles drawn on the earth, to which they have given the names of Equator, Meridian, Parallels of Latitude, Tropics, Polar Circles, &c.

The Tropics are two circles, parallel to the equator, and distant from it 23 degrees, 28 minutes ; that on the north side of it is called the Tropic of Cancer ; the other on the south side, is called the Tropic of Capricorn. When the sun comes to either tropic, it has its greatest declination, either north or south, which is about the twenty-first of June, and twenty-second of December.

The Polar Circles are also parallel to the equator, compassing the poles of the world at 23 degrees, 28 minutes distance ; that about the North Pole is called the Arctic Circle, and the other is called the Antarctic Circle.

These Tropics and Polar Circles divide the globe of the earth into five parts, called Zones ; the two parts within the polar circles are called the frigid zones ; the two parts between the polar circles and tro-

---

**The Moon is the Satellite of the Earth.* *†Vesta, Ceres, Pallas and Juno, are named Asteriods, by* Dr. Herschel.

Examples in Subtraction.

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The earth revolves around the sun once a year, which brings the various seasons, viz. Spring, Summer, Autumn, and Winter. Besides, the earth revolves around its axis from west to east every twenty-four hours, which causes the sun, moon, and planets apparently to rise and set, and, is evidently the cause of day and night.

The earth is attended by a satellite, called the moon, whose diameter is 2180 miles; her distance from the centre of the earth is 240,000 miles. She revolves around the earth, from west to east, in about 29½ days, from one change to another.

There are in our Solar System, besides the moon, eleven Planets, or Worlds, which revolve around the sun, in their respective orbits, at different distances. Their names, magnitudes, distances from the sun, periodical revolutions, diurnal rotations, and number of satellites, are exhibited in the following Table.

A TABLE OF THE SOLAR SYSTEM,

From the most modern and approved Authors.

Sun and Planets.	*Diam. in miles.*	*Distance from the Sun.*	*Time of revolv. round the sun.*			*Diurnal rotation.*			*Satellites.*
			Days.	*h.*	*m.*	*d.*	*h.*	*m.*	
☉ Sun	883,246	*miles.*	. . . . . .			25	14	8	
☿ Mercury	3,224	37,000,000	87	23	16	unknown.			
♀ Venus	7,687	68,000,000	224	16	50		23	25	
⊕ Earth	7,928	95,000,000	365	5	49		23	56	*1
☽ Moon	2,180	95,000,000	365	5	49	27	7	43	
♂ Mars	4,189	144,000.000	686	23	30	1	00	39	
* Vesta†	unknown.	207,000,000	1,161	00	00	unknown.			
* Juno	119	286,000,000	1,587	00	00	unknown.			
* Pallas	110	267,000,000	1,683	00	00	nnknown.			
✱ Ceres	160	264,000,000	1,617	00	00	unknown.			
♃ Jupiter	89,170	490,000,000	4,332	14	26		9	56	4
♄ Saturn	79,042	900,000,000	10,759	1	51		10	16	7
♅ Herschel	35,112	1,800,000,000	30,737	18	00	unknown.			6

Having given a cursory view of the Solar System, we shall now be more particular respecting the figure and motion of the earth, with various imaginary lines upon it.

That the earth, or planet on which we live is round, or nearly so, will appear, not only from the circular shadow it casts upon the moon, when eclipsed, but also from the appearance of objects at sea; for when a ship is making towards the land, the mariners first descry the tops of mountains, steeples, &c. pointing above the water; the lower parts being hid, by reason of the curvature of the earth.

In order to describe the situation and position of places, Geographers have found it necessary to imagine various lines and circles drawn on the earth, to which they have given the names of Equator, Meridian, Parallels of Latitude, Tropics, Polar Circles, &c.

The Tropics are two circles, parallel to the equator, and distant from it 23 degrees, 28 minutes; that on the north side of it is called the Tropic of Cancer; the other on the south side, is called the Tropic of Capricorn. When the sun comes to either tropic, it has its greatest declination, either north or south, which is about the twenty-first of June, and twenty-second of December.

The Polar Circles are also parallel to the equator, compassing the poles of the world at 23 degrees, 28 minutes distance; that about the North Pole is called the Arctic Circle, and the other is called the Antarctic Circle.

These Tropics and Polar Circles divide the globe of the earth into five parts, called Zones; the two parts within the polar circles are called the frigid zones; the two parts between the polar circles and tro-

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**The Moon is the Satellite of the Earth. †Vesta, Ceres, Pallas and Juno, are named Asteriods, by* Dr. Herschel.

pics, are called the temperate zones ; and the part between the tropics, is called the torrid zone.

There are also various real divisions of the earth's surface, formed by nature, such as Continents, Oceans, Seas, &c.

A Continent is a great quantity of land, not divided by sea, wherein are several empires, kingdoms and countries conjoined ; as that containing Europe, Asia and Africa.

An Ocean is a vast collection of salt water, separating Continents and washing their borders or shores ; as the Atlantic, Pacific, and Indian Oceans.

A Sea is part of an Ocean, to which we must sail through some Strait, as the Mediterranean Sea.

There are, likewise, Bays, Creeks, Rivers, Islands, Lakes, Capes, Mountains, &c.

* * *

Day and night arise from the diurnal rotation of the earth around its axis, which is a straight line imagined to pass through the centre of the earth ; the extreme points thereof, are the Poles, on which the earth is supposed to move, or turn round ; one called the North Pole, and the other the South Pole.

The Equator is a great circle round the middle of the earth, equally distant from each pole, dividing the globe into two equal parts, called the Northern and Southern Hemispheres ; from it the latitudes of places are reckoned, either north or south, and on it are counted the degrees of longitude, east and west.

Latitude is the nearest distance of any place from the equator, either north or south, reckoning in degrees and minutes, on a meridian. As latitude begins at the equator, where it is nothing ; so it ends at the poles, where the latitude is the greatest, or 90°

The Parallel of Latitude of any place is a circle passing through that place, parallel to the equator. Every place on the earth has its parallel of latitude.

The meridian of any place, is a semicircle passing through that place, and terminating at the poles of the earth. Meridians are almost infinite in number ; for all places from east to west have their several meridians ; and when the sun comes to the meridian of any place, it is then noon, or mid-day at that place.

The First Meridian, from which the longitudes of places are reckoned, is an imaginary semi-circle, or meridian, passing through any remarkable place, and is therefore arbitrary. The English and Americans, generally place the first meridian at Greenwich, the French place it at Paris, the Spaniards at Cadiz, &c. In this work, Greenwich will be reckoned the first meridian.

The Longitude of any place is that portion of the equator which is contained between the first meridian, and the meridian of the given place.

The Difference of Longitude between any two places, is the intercepted portion of the equator between the meridians of those places.

The visible Horizon is that apparent Circle which limits, or bounds the view of the spectator on the sea, or on an extended plain; the eye of the spectator being always supposed in the centre of his horizon; his Zenith being the point in the Heavens directly over his head, or 90° from the horizon. The point of the heavens opposite to the Zenith, or under us, is called the Nadir.

When the sun or stars come above the eastern part of the horizon, they are said to rise; and when they descend below the western part, they are said to set.

The horizon is represented by the Mariner's Compass, divided into 32 Points, or Rhumbs, each 11° 15′.

NAVIGATION.

NAVIGATION, as it is here understood, is the conducting a ship through the ocean, in such a manner as to be able at any time to know the latitude and longitude she is in, whereby her true place on the globe is known.

Latitude, as before mentioned, is the distance of any place from the equator, either north or south; therefore a ship in north latitude, sailing northerly, or in south latitude, sailing southerly, increases her latitude; but a ship in north latitude sailing southerly, or in south latitude sailing northerly, decreases her latitude; because she sails nearer the equator.

The Longitude of a place is said to be east or west, according as the place is on the east or west side of the first meridian, and it cannot exceed 180 degrees; consequently, a ship in west longitude, sailing westerly, or in east longitude, sailing easterly, increases her longitude; but a ship in west longitude, sailing easterly, or in east longitude, sailing westerly, decreases her longitude.

PROBLEM I.

Two places lying in different latitudes, which are given, to find the difference of latitude between them.

RULE.

If the latitudes be both north, or both south, subtract the less from the greater; the remainder will be the difference of latitude; but if one latitude is north, and the other south, add both latitudes together, and their sum will be the difference of latitude.

EXAMPLES.

I. Required the difference of latitude between Sandy-Hook and Bermudas.

Latitude of Sandy-Hook, 40° 28′N.
Latitude of Bermudas, 32 25 N.

Difference of latitude, 8 3=483 miles.

II. What is the difference of latitude between Bermudas and the Cape of Good-Hope.

Latitude of Bermudas, 32° 25′N.
Latitude of the Cape of G. H. 34 29 S.

Difference of latitude, 66 54

III. What is the difference of latitude between Boston Light-house, in lat. 42° 20′N. and Cape Verd, in lat. 14° 44′N.

Ans. 27° 36′=1656m.

IV. What is the difference of latitude between Cape Ledo, in lat. 9° 50′S. and the Cape of Good-Hope, in lat. 34° 29′S.

Ans. 24° 39′=1479m.

V. A ship from a port in latitude 36° 28′N. sails southerly, till by observation she is in latitude 26° 14′N.; what difference of latitude has she made? *Ans.* 10° 14′=614 *miles.*

PROBLEM II.

The latitude sailed from, and difference of latitude given, to find the present latitude, or latitude come to.

RULE.

If the latitude sailed from and difference of latitude made, be of the same name, their sum will be the latitude arrived in; but if they are of a contrary denomination, their difference will be the latitude in, of the same name with the greater.

EXAMPLES.

I. A ship from Bermuda, sails northerly, till she differs her latitude 280 miles, what latitude does she arrive in?

Latitude of Bermuda, 32° 25′N.
Diff. of lat. made, 280 m. or 4 40 N.

Latitude come to 37 05 N.

II. A ship from Montock point, sails south 165 miles; required her latitude in?

Latitude of Montock point, 41° 04′N.
Difference of latitude, 2 45 S.

Latitude arrived in, 38 19 N.

III. A ship from latitude 35° 40′S. sails southerly, till her difference of latitude is 260 miles; what is her present latitude?

Ans. Lat. in 40° 00′S.

IV. A ship from latitude 30° 10′S. sails northerly, till she has made 336 miles northing; required the latitude arrived in?

Ans. 24° 34′S.

V. A ship from Bermuda, lat. 32° 25′N. sails southerly, till she has made 1945 miles difference of latitude; required her latitude in?

Ans. 0° 0′ or on the Equator.

VI. A ship from latitude 2° 0′S. sails north 150 miles; what latitude is she in?

Latitude sailed from 2° 00′S.
Diff. lat. 150 miles, or 2 30 N.

Latitude in, 0 30 N. having crossed the Equator.

VII. A ship from latitude 10° 4′N. sails south 734 miles; what latitude is she in? *Ans.* 2° 10′S.

PROBLEM III.

The longitude of two places being given, to find the difference of longitude between them.

RULE.

If the longitudes be both east, or both west, subtract the less from the greater, and the remainder will be the difference of longitude; but if one longitude be east and the other west, add them together, and their sum will be the difference of longitude, if less than 180°, but if the sum exceed 180°, subtract it from 360°, and the remainder will be the difference of longitude.

EXAMPLES.

I. What is the difference of longitude between Montock point, and Georgetown, in Bermuda?

Montock's longitude,	72° 01'W.
Georgetown's longitude,	64 40 W.
Difference of longitude,	7 21=441 miles.

II. What is the difference of longitude between Philadelphia and the Cape of Good-Hope?

Philadelphia's longitude,	75° 04'W.
Cape of Good-Hope, in long.	18 23 E.
Difference of longitude,	93 27=5607 miles.

III. Required the difference of longitude between Washington City, and Manilla.

Washington City's longitude,	77° 14'W.
Manilla's longitude.	120 51 E.
Sum exceeds 180°	198 05
	360 00
Difference of longitude,	161 55

IV. What is the difference of longitude between the Cape of Good-Hope, in longitude 18° 23'E. and Cape Pedro, in longitude 55° 27'E.

Ans. 37° 04'=2224 m.

PROBLEM IV.

The longitude sailed from, and difference of longitude made, being given, to find the longitude in.

RULE.

If the longitude sailed from, and difference of longitude be of the same name, that is, both east, or both west, their sum is the longitude in, if it be less than 180°, but if the sum exceed 180°, subtract it from 360°, leaves the longitude in, of a different name from the longitude sailed from; but if the longitude sailed from, and difference of longitude made, be of different names, that is, one east and the other west, subtract the less from the greater, this leaves the longitude in, of the same name with the greatest.

EXAMPLES.

I. A ship from Bermuda, sails westerly, till she differs her longitude 380 miles; what is her present longitude?

Longitude of Bermuda, 64° 40′W.
Diff. long. 380 miles, or 6 20 W.

Longitude in, 71 00 W.

II. A ship from Barbadoes, sails eastward, till her difference of longitude be 400 miles; what longitude is she in?

Barbadoes' longitude 59° 49′W.
Diff. of long. 400 miles, or 6 40 E.

Longitude in, 53 09 W.

III. A ship from longitude 5° 14′W. sails eastward, till she differs her longitude 434 miles; what longitude is she in?

Longitude sailed from, 5° 14′W.
Diff. of long. 434 miles, or 7 14 E.

Longitude in, 2 00 E.

In the above example the ship has crossed the first meridian.

IV. A ship from longitude 40 30′E. sails westward, till she differs her longitude 27° 30′; what longitude is she in?

Ans. 13° 00′E.

V. A ship from longitude 86° 42′E. sails easterly, till her difference of longitude is 450 miles; required the longitude in?

Ans. 94° 12′E.

VI. A ship from longitude 160° 20′W. sails westward until she differs her longitude 51° 20′; what longitude is she in?

Longitude left 160° 20′W.
Diff. of longitude, 51 20 W.

211 40 W.
360 00

Longitude in, 148 20 E.

In the above example, the ship has crossed the opposite meridian, having sailed west, to 211° 40′W. long. which is 148° 20′E. long.

VII. A ship from the Start, in latitude 50° 13′N. longitude 3° 38′W. sailed between the south and west, until the difference of latitude was 9° 43′; and difference of longitude 12° 18′: Required the latitude and longitude of the ship?

Latitude of Start,	50° 13′N.	Longitude,	3° 38′W.
Diff. of latitude,	9 43 S.	Diff. of long.	12 18 W.
Latitude in,	40 30 N.	Long. in,	15 56 W.

A TABLE of the Angles which every point of the compass makes with the Meridian:

North.	South.	Points.	D. M.	North.	South.
		¼	2 49		
		½	5 37		
		¾	8 26		
N. by E.	S. by E.	1	11 15	N. by W.	S. by W.
		1 ¼	14 4		
		1 ½	16 52		
		1 ¾	19 41		
N. N. E.	S. S. E.	2	22 30	N. N. W	S. S. W.
		2 ¼	25 19		
		2 ½	28 7		
		2 ¾	30 56		
N.E.b.N.	S.E.by.S.	3	33 45	N.W.byN.	S.W. by S.
		3 ¼	36 34		
		3 ½	39 22		
		3 ¾	42 11		
N. East.	S. East.	4	45 0	N. West.	S. West.
		4 ¼	47 49		
		4 ½	50 37		
		4 ¾	53 26		
N.E.byE.	S.E byE.	5	56 15	N.W.byW.	S.W.byW.
		5 ¼	59 4		
		5 ½	61 52		
		5 ¾	64 41		
E. N. E.	E. S. E.	6	67 30	W. N. W.	W. S. W.
		6 ¼	70 19		
		6 ½	73 7		
		6 ¾	75 56		
E. by N.	E. by S.	7	78 45	W. by N.	W. by S.
		7 ¼	81 34		
		7 ½	84 22		
		7 ¾	87 11		
East.	East.	8	90 0	West.	West.

PLANE SAILING.

IN Plane Sailing the earth is supposed to be an extended plane. In this sailing therefore, the meridians are considered as parallel straight lines, and the parallels of latitude straight lines, equidistant from each other. Four things are principally concerned in this sailing, viz. the Course, Distance, Difference of Latitude and Departure.

I. Course, is the point of the compass steered, and is counted from the north or south points, according as the ship sails northerly, or southerly, to the east or west points of the horizon, or compass card.

II. Distance, is the distance run by the ship, determined by the Log, or otherwise.

III. Difference of Latitude is the distance which the ship makes, or gains north, or south of the place sailed from, and is known which way by the letters N. or S. in the course.

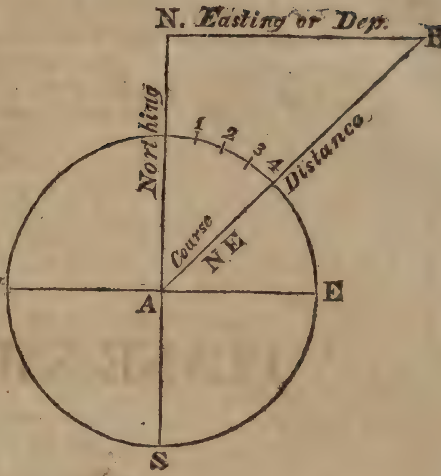
IV. Departure is the distance the ship makes, or gains east or west of the meridian sailed from, and is known which way by the letter E. or W. in the course. Consequently,

1. If a ship sail due north, or due south, she makes no departure.

2. If a ship sails due east, or due west, she makes no difference of latitude.

3. If a ship sail on any oblique course, she will make both difference of latitude and departure. more or less, according to the course and distance, which may be readily found, by Inspection in Table 1. or II. in which the difference of latitude and departure, are already calculated for every degree, point and quarter of the compass, and for any distance, up to 300 miles. In using these tables, the words, Dist. Lat. Dep. are placed at the top and bottom of the tables, and if the course be 4 points, or 45°, the latitude and departure are alike ; if the course be less than 4 points, it will be found at the top of the table ; if more than 4 points, it will be found at the bottom.

In order to explain the above, let A represent the position of any given place, and AN, the meridian of that place: also let AB represent the line described by a ship, and B the point arrived at. Then the angle at A is the course, which in this example is N.E or 4 points from the meridian. AB is the distance, AN the difference of latitude, or northing, and NB the departure.



CASE 1.*

Course and distance sailed being given, to find the difference of latitude and departure from the meridian.

RULE.

Find the given course at the top or bottom of the Table of Latitude and Departure for points of the compass, or for degrees—according as the given course is expressed—and in that page, and right against the distance found in its own column, will stand the difference of latitude and departure in their respective columns.

Examples.

I. A ship from Montock point, sails S. E. by S. 241 miles; required the latitude come to, and her departure from the meridian she sailed from.

Thus, I find the course, 3 points at the top of the Table for points, and the distance 241 miles, in distance column, opposite to which is the difference of latitude 200.4 in a latitude column, and the departure 133.9 in a departure column.

Latitude of Montock,	41° 04′N.
Diff. of lat. made, 200 miles,	3 20 S.
Latitude arrived in,	37 44 N.

II. A ship sails N. W. by W. 49 miles; what difference of latitude and departure does she make?

Here the course, 5 points will be found at the bottom of the tables, and the distance 49 in its column, opposite to which, in the column marked Lat. at the bottom, stands 27.2 the difference of latitude, and in column marked Dep. stands 40.7 the departure.

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[*] In any of the Cases, if the numbers in the given Difference of Latitude, Departure, or Distance, be too large to be found in the Tables, take a proportional part, such as one half, one quarter, or any other convenient proportion of the given Difference of Latitude, Departure, or Distance, against which, in its column, will be found the same proportional part of that which is sought.

III. A ship from latitude 35° 14'S. sails S.S.E. 300 miles ; required the latitude in, and her departure from the meridian sailed from.

Ans. Lat. in 39° 51'S. Dep. 114.8E.

IV. A ship from Bermuda, in latitude 32° 25'N. sails E. S. E. 277 miles ; what latitude has she come to, and how much easting has she made ? *Ans.* Lat. in 30° 39'N. Dep. 255.9E.

V. A ship from latitude 2° 13'S. sails N.N.W. 144 miles ; what latitude has she come to and how much westing has she made ?

Ans. She has come to lat. 0° 00', or on the Equator,
and has made 55.1 Dep. W.

VI. A ship from latitude 3° 22'N. sails S.E. by E. 600 miles ; required her difference of latitude, departure, and latitude arrived in.

Here 600 miles being too large for the Tables. divide it by 2, or any other convenient number, and that gives 300 ; then the course 5 points, and distance 300, give difference of latitude 166.7, and departure 249.4, which being doubled gives the difference of latitude sought, 333.4, and departure 498 8 easting.

Latitude from, 3° 22'N.
Difference of latitude 333, or 5 33 S.

The ship has arrived in lat. 2 11 S. having crossed the equator.

CASE II.

Given the course and difference of latitude, to find the distance and departure.

RULE.

Find the course among the points or degrees, and the difference of latitude in its column, against which will stand the distance and departure in their respective columns.

EXAMPLES.

I. A ship from Bermuda sails N.N.W. until by observation she is in latitude 36° 10'N. I demand her distance and departure ?

Latitude of Bermuda, 32° 25'N.
Latitude by observation, 36 10 N.

Difference of latitude, 3 45=225 miles.

Thus, under the course 2 points, I find the difference of latitude 225 in a latitude column, opposite to which is the distance 244 in distance column, and the departure 93.4 in a departure column.

II. A ship sails S.E. by E. until she makes 139 miles difference of latitude ; I demand her distance and departure ?

Ans. The distance is 250 miles, and departure 207.9.

III. Yesterday noon, we were in lat. 1° 30'N. since which we have sailed S S.E. till this day noon, and find by observation, that we are in latitude 1° 04'S. Required the distance sailed, and departure from the meridian ?

In this case the ship has crossed the equator ; therefore the sum of the two latitudes is the difference of latitude.

Ans. The distance is 167 miles, and departure 63.9 easting.

IV. A ship from Montock, in latitude 41° 04'N. sails E.S.E. until she arrives in latitude 39° 10'N. Required her distance and departure?

Ans. Distance 298 miles, and departure 275 easting.

V. A ship from the equator, sails N. W. till she arrives in latitude 3° 32'N. Required her distance and departure.

Ans. Distance 300 miles, and departure 212.1 west.

CASE III.

Given the course and departure, to find the distance and difference of latitude.

RULE.

Find the course either among the points, or degrees, and the departure in its column, against which will stand the distance and difference of latitude in their respective columns.

EXAMPLES.

I. A ship from Montock sails S.E by E. until she makes 129 miles easting; required her distance, difference of latitude, and lat. come to?

Thus, I find the course 5 points, at the bottom of the Tables, and opposite to the departure 129, or nearest thereto, 128.9 in its proper column, and the distance 155, and difference of latitude 86.1, in their respective columns.

Montock's latitude,	41° 04'N.
Difference of latitude,	1 26' S.
Latitude come to,	39 38 N.

II. A ship from Bermuda, in latitude 32° 25'N. sails N.N.E.½E. until her departure be 115 miles; required the distance sailed, and latitude come to?

Ans. Distance sailed 244 miles.
Latitude com to, 36° 0'N.

III. A ship from latitude 20° 10'S. sailed N.W.¾N. and made 137 miles of departure; required the distance sailed, and latitude come to?

Ans. The distance is 230 miles.
Latitude come to 17° 05'S.

IV. A ship from the equator sails E. ½ S. until she makes 298.6 easting; required the distance sailed and latitude in?

Ans. The distance is 300 miles.
Latitude in 0° 29'S.

V. A ship from 2° 40'N. sails S. by E. ¾ E. until she has made 100 miles easting; required her distance sailed and latitude come to?

Ans. The distance is 297 miles; having crossed the equator.
The latitude come to, 2° 00'S.

CASE IV.

Given the distance and difference of latitude, to find the course and departure.

RULE.

Seek in the tables, till against the distance taken in its column, be found the given difference of latitude in one of the following columns; and adjoining to it will stand the departure, which, if less than the difference of latitude, the course is to be found at the top, but, if greater, the course is to be found at the bottom.

EXAMPLES.

I. A ship from the Island of Teneriffe, in latitude 28° 23'N. sailed 210 miles, upon a direct course between the north and east, and by observation was found to be in latitude 31° 17'N. Required the course and departure ?

Latitude of Teneriffe, 28° 23'N.
Latitude by observation, 31 17 N.

Difference of latitude, 2 54=174 miles.

Now I look over Tables I. or II. till I find the page, where, against the given distance, in its proper column, will be found the given difference of latitude in one of the adjoining columns, and by turning over, I find that under 34°, and adjoining to the given distance 210, in its column, stands 174, the given difference of latitude, marked Lat. at the top, the course therefore is N. 34° E. or N. E. by N. nearly, and the corresponding departure is 117.4 east.

II. A ship sails 215 miles, between the south and east, until she has made 167 miles difference of latitude ; what course has she steered, and how much departure has she made ?

Ans. { The course is S. 39° E. or S.E. by S. ½E.
The departure is 135.3 easting.

III. A ship from Montock sails 300 miles between the south and east, until by observation, she is in latitude 38° 17'N. Required her course and departure ?

Ans. { Her course is S.E. by E. nearly.
Her departure is 249.4E.

IV. Suppose a ship sail 259 miles between the north and west, from a port in 2° 40' south latitude, and then, by observation is in 1° 20' north latitude ; I demand her course and departure ?

Ans. { The course is N. 22° W.
The departure is 97'W.

V. A ship from latitude 3° 56'N. sails 284 miles between the south and east, and arrives at the equator ; I demand her true course and departure ?

Ans. { By Table I, the course is 3 points, or S.E. by S.
The departure is 157.8 easting.

CASE V.

Given the distance and departure, to find the course and difference of latitude.

RULE.

Seek in the Tables, till against the distance, taken in its column, be found the given departure in one of the following columns ; and adjoining to it will stand the difference of latitude ; if this be greater than the departure, the course will be found at the top ; but, if less, the course is to be found at the bottom.

EXAMPLES.

I. From latitude 40° 36′N. a ship sailed 261 miles between the south and west, and made 146 miles departure; required the course and latitude come to?

The given distance 261, and the departure 146, will be found to correspond nearest under 34°, which is therefore the course; and the difference of latitude answering to it, is 216 miles.

Latitude left, 40° 36′N.
Difference of latitude, 3 36 S.

Latitude come to, 37 00 N.

II. A ship from Bermuda, in latitude 32° 25′N. sails 300 miles between the north and west, and makes 257 miles westing; what course has she steered, and what latitude has she come to?

Ans. Course N. 59° W. or N.W. by W. ¼ W.
Latitude come to, 34° 59′N.

III. From latitude 1° 43′N. a ship sailed 241 miles between the south and east, and made 92 miles departure. Required the course, and latitude come to?

Ans. The course is S.S.E.
The latitude come to is 2° 0′S.

CASE VI.

Given the difference of latitude and departure, to find the course and distance.

RULE.

Find, in the Tables, the numbers nearest to those of the given difference of latitude, and the departure, together in their respective columns; against them will be the distance in the dist. column; then the course will be found at the top of the Table, if the difference of latitude be greater than the departure, but if it be less, the course will be found at the bottom of the Table.

EXAMPLES.

I. A ship sails between the south and east, until she makes 209 miles southing, and 141 miles easting; I demand her course and distance?

Now, the difference of latitude 209, and the departure 141, are found to agree nearest under 34°, or 3 points, which is the course, and the corresponding distance, 252. stands in its column.

II. A ship from latitude 31° 25′S. sailed between the north and west, and by observation is found to be in latitude 29° 15′S. and made 244.6 miles of easting. Required the course and distance.

Latitude left, 31° 25′S.
Latitude by observation, 29 15 S.

Difference of latitude, 2 10=130 miles.

Here the difference of latitude being less than the departure, the course will be found at the bottom of the Tables. Now the difference of latitude 130, and the departure 244.6, are found to agree over 62°, which is the course, and the corresponding distance is 277 miles.

III. A ship from latitude 32° 20′N. sails between the south and west, till she arrives in latitude 27° 57′N. and has made 51 miles departure. Required her course and distance?

Ans. The course is S. 11°W. or S. by W.
The distance is 268 miles.

IV. A ship from 1° 20′ south latitude sails between the north and east, till by observation she is in latitude 1° 20′N. and has made 220 miles easting. I demand the course and distance?

Ans. The course is N. 54° E. or N.E. $\frac{3}{4}$ E.
The distance sailed is 272 miles.

V. A ship from latitude 5° 00′N. sailed between the south and east, until she arrived at the equator, and made 400 miles easting. Required her true course and distance?

Ans. The course is S. 53° E. or S.E. $\frac{3}{4}$ E.
The distance is 500 miles.

VI. Two ports lie under the same meridian, one in the latitude of 40° 09′N. and the other in the latitude of 38° 00′N. A ship from the southernmost, sails due east 215 miles, and meets a sloop that had sailed on a direct course from the northernmost port. Required the sloop's true course and distance?

Ans. Sloop's course S. 59° E. or S.E. by E. $\frac{1}{4}$ E.
Distance run 251 miles.

VII. A ship in north latitude, sailed between the north and west, having made 168 miles of westing, and raised the north pole 4° 0′. Required the course and distance?

Ans. The course is N. 35° W.
The distance is 293 miles.

TRAVERSE SAILING.

IF a ship, meeting contrary winds, or from other causes, sail on several courses in a given time, the irregular track she describes is called a Traverse.

To reduce these several courses and distances into a single, or direct course and distance made good, is called resolving a traverse; which is performed by the following

GENERAL RULE.

1. Make a Traverse Table, as in the following example, in which the first column is for the course steered, and the second for the distances run on their respective courses; the columns marked N. S. are for the difference of latitude made on each course and distance, which is always north or south, and is known by the letters N. or S. in the course; the other two columns marked E. and W. are for the respective departures, which are always east or west, and are known by the letters E. or W. in the course.

2. Find the difference of latitude and departure made on each course

and distance, (by Plane Sailing, Case I.) and place them in their proper columns, in a line with their respective courses and distances.

3. Add up the northing, southing, easting and westing columns, and set down the sum of each at its bottom; then the difference between the sums of the north and south columns, will be the difference of latitude made good, of the same name with the greater; and the difference between the sums of the east and west columns, is the departure made good, of the same name as the greater sum.

4. With the difference of latitude and departure made good, in your Traverse Table, as above, find the course and distance. (as in the 6th Case of Plane Sailing,) by seeking in the Tables, till the difference of latitude and departure are found together in their respective columns; then against them will be the distance in its column, and the course will be found at the top of the Table, if the departure be less than the difference of latitude, otherwise at the bottom; which will be the course and distance made good.

EXAMPLES.

I. A ship from Montock point, sailed S.S.E. 15 miles, S.E. 34 miles, W. by S. 16 miles, W.N.W. 39 miles, S.W. by S. 40 miles. Required the latitude come to, and the course and distance made good?

TRAVERSE TABLE.

COURSES.	DIST.	N.	S.	E.	W.
S.S.E.	15	- - - -	13.9	5.7	- - - -
S.E.	34	- - - -	24.0	24.0	- - - -
W. by S.	16	- - - -	3.1	- - - -	15.7
W.N.W.	39	14.9	- - - -	- - - -	36.0
S.W. by S.	40	- - - -	33.3	- - - -	22.2
From sum —	—	14.9	74.3	29.7	73.9
Take . . —	—	- - - -	14.9	- - - -	29.7
Remains —	—	Diff. Lat.	59.4	Dep.	44.2

Here each column respectively, being summed up, shows the westing is greater than the easting by 44.2, and that the ship's departure made good, is so much west of her first meridian.

Also, the southing being greater than the northing by 59.4, the difference of latitude made good. Thence, to find the ship's course and distance made good from Montock;

With the difference of latitude 59.4, and the departure 44.2, I enter the Tables I. or II, and find these numbers nearly agree under 37°, which is the course, and the corresponding distance is 74 miles. Therefore, the direct course from Montock is S. 37° W. or S.W. by S. ¼ W. and the distance 74 miles.

Montock's latitude, - 41° 04′N.
Difference of latitude made, 0 59 S.

Latitude come to, 40 05 N.

II. A ship from Block Island, in latitude 41° 10′N. sailed as under. Required the latitude come to, and the course and distance made good?

COURSES.	DIST.	N.	S.	E.	W.
S.E. by S.	20	----	16.6	11.1	----
N.W. by W.	40	22.2	----	----	33.3
South.	20	----	20.0	----	----
East.	15	----	----	15.0	----
S.W.	25	----	17.7	----	17.7
North.	10	10.0	----	----	----
W. by N.	11	2.1	----	----	10.8
		34.3	54.3	26.1	61.8
			34.3		26.1
Cou. S. 61°W.	D.41m.	— —	20.0		35.7

Block Island's latitude, 41° 10′N.
Difference of latitude made, 0 20 S.

Latitude come to, 40 50 N.

III. Yesterday noon we were in latitude 36° 40′N. Since which we have sailed on the following courses, viz. N.W. by N. 40 miles; W. ½ N. 34 miles; N.W. by W. ¾ W. 42 miles; North 26 miles; and East 40 miles. Required the ship's direct course and distance made good, and the latitude come to?

Ans. { Course N. 34° W. and dist. 97 miles.
Latitude come to, 38° 01′N.

IV. A ship from 1° 20′ north latitude, meeting coutrary winds, sails on the following courses, viz. S.S.E ½ E. 33 miles, S.W by W. 40 miles, S. E. by S. 44 miles, North 36 miles, S.W. by S. 44 miles, S.E. by E. 40 miles, and S.S.W. ½ W. 33 miles Required the course and distance made good, and the latitude come to?

Ans. { The course made good is due south, and the dist. is 140 m.
The latitude come to is 1° 00′S.

PARALLEL SAILING.

IN Plane Sailing, the earth was considered as an extended plane, having the meridians parallel to each other; but the figure of the earth is spherical, or globular; the meridians, therefore, gradually approach each other, and meet at the poles; hence degrees of longitude decrease in length, as you sail north or south from the equator.

Parallel Sailing is when a ship sails due east or west, and thus describes a parallel of latitude.

Two things are principally concerned in Parallel Sailing, viz. the difference of longitude, and meridian distance.

1. The difference of longitude between any two places, is the arch of the equator intercepted between the meridians of the given places.

2. The meridian distance between two places, in the same parallel of latitude, is the arch thereof contained between their meridians. And since all the meridians converge from the equator to the poles, it is evident that the meridian distance, or the distance between any two meridians in any parallel of latitude, is less than the difference of longitude, which is always reckoned on the equator.

Having the latitude of the parallel, the meridian distance may be inferred from the difference of longitude; or the difference of longitude may be found by the meridian distance, by the following Problems.

PROBLEM I.

The difference of longitude between two places, in the same parallel of latitude being given, to find the distance between them.

RULE.

Find the complement of the latitude among the degrees in Table II. and in the distance column, the difference of longitude, opposite to which in the column of departure, is the distance required.

Or, Take the latitude only, (instead of its complement) and look in a latitude column adjoining, instead of a departure column (as above) which will give the same distance.

EXAMPLE.

Suppose a ship in latitude 43° 56′ north or south, sail directly east or west, until her difference of longitude be 4° 20′=260 miles. Required the distance sailed?

The nearest degree to the complement of the latitude is 46°, under which, I find the difference of longitude 260, in distance column, opposite thereto in departure column, stands the sought distance, or departure 187 miles.

PROBLEM II.

The meridian distance or departure of two places on the same parallel of latitude given, to find their difference of longitude, and longitude in.

RULE.

If you take the complement of the latitude among the degrees in Table II. as if it were a course, and the departure in its column, the corresponding distance will be the difference of longitude.

But, If you take the latitude only (instead of its complement) as a course, you must find the nearest number to your departure in a latitude column, and adjoining to which, will stand the difference of longitude in a distance column.

EXAMPLES.

1. Suppose a ship in latitude 43° 56′ north or south, and longitude 20° 14′W. sail directly west 187 miles; required the difference of longitude, and longitude in?

Thus, under the complement of the latitude 46°, I find the departure 187, in its column answering to which in distance column, stands the difference of longitude 260 miles.

Longitude sailed from,	20° 14′W.
Difference of longitude,	4 20 W.
Longitude in,	24 34 W.

11. A ship from latitude 47° 30′N. and longitude 26° 15′W. sails due east 164 miles; required the difference of longitude, and longitude in?

Thus, over latitude 47° I seek for 164 in latitude column, which corresponds to distance 241; and over 48° I find it nearly corresponds to 245; half the sum of 241 and 245 is 243, which is the sought difference of longitude.

Longitude left,	26°	15′W.
Diff. long. 243 miles, or	4	03 E.
Longitude come to,	22	12 W.

The following Table shows how many Miles answer to a Degree of Longitude at every Degree of Latitude.

D.L.	MILES.	D.L.	MILES.	D.L.	MILES.	D.L	MILES.	D.L.	MILES.
1	59 99	19	56 73	37	47 92	55	34 41	73	17 54
2	59 96	20	56 38	38	47 28	56	33 55	74	16 53
3	59 92	21	56 01	39	46 62	57	32 68	75	15 52
4	59 86	22	55 63	40	45 95	58	31 79	76	14 51
5	59 77	23	55 23	41	45 28	59	30 90	77	13 50
6	59 67	24	54 81	42	44 59	60	30 00	78	12 48
7	59 56	25	54 38	43	43 88	61	29 09	79	11 45
8	59 42	26	53 93	44	43 16	62	28 17	80	10 42
9	59 26	27	53 46	45	42 43	63	27 24	81	9 38
10	59 08	28	52 97	46	41 68	64	26 30	82	8 35
11	58 89	29	52 47	47	40 92	65	25 36	83	7 32
12	58 68	30	51 96	48	40 15	66	24 41	84	6 28
13	58 46	31	51 43	49	39 36	67	23 45	85	5 23
14	58 22	32	50 88	50	38 57	68	22 48	86	4 18
15	57 95	33	50 32	51	37 76	69	21 50	87	3 14
16	57 67	34	49 74	52	36 94	70	20 52	88	2 09
17	57 37	35	49 15	53	36 11	71	19 54	89	1 05
18	57 06	36	48 54	54	35 26	72	18 55		

MIDDLE LATITUDE SAILING.

MIDDLE Latitude Sailing is a short, easy method of resolving those problems in sailing, in which the ship sails neither upon a meridian nor parallel, but crosses several meridians and parallels, and then arrives at a different latitude from that which she left; and, as it is plain, by the foregoing Table, that the miles answering to a degree of longitude in one parallel, are different from those in another parallel, we add both latitudes together, and take half their sum for the *mean*, or *middle latitude*, which is supposed to be the latitude of that parallel whose arch is equal to the departure; which, indeed, is not strictly true; however, the difference of longitude inferred therefrom, in short runs and a day's work, is sufficiently correct for common practice ; but in calculating distances across distant parallels, it is not to be depended on.

Middle latitude sailing, is a combination of plane and parallel sailing, and will admit of ten or twelve different Cases ; nevertheless, the practical use of this sailing, in common navigation, is principally derived from the solution of the two following cases, viz. The middle latitude and difference of longitude given to find the departure ; or the departure given to find the difference of longitude.

CASE I.

The latitudes and longitudes of two places given, to find the direct course and distance between them.

RULE.

1. Find the difference of latitude and difference of longitude, in miles, between the two places ; then add both latitudes together, and half their sum will be the middle latitude, if the latitudes be of the same name ; but if the latitudes be of different names, take half their difference.

2. Look for the complement of middle latitude, as if it were a course in Plane Sailing, and difference of longitude in the distance column ; opposite to which stands the departure in its column. But if you take the middle latitude (instead of its complement) as a course, and the difference of longitude in a distance column, the departure will stand in the adjoining latitude column, (instead of a departure column as above) which brings the same result.

EXAMPLE.

Required the direct course and distance from a Lighthouse in latitude 41° 28'N. and longitude 71° 30'W. to a Cape in latitude 38° 57'N. and longitude 74° 55'W.

A Lighthouse, lat.	41° 28'N.	Long.	71° 30'W.
A Cape, latitude	38 57 N.	Long.	74 55 W.
Diff. of latitude,	2 31=151 m.	Diff. Long.	3 25=205 m.
Sum of latitudes,	80 25		
Middle latitude,	40 12	Its complement,	49° 48'

Under the complement of the middle latitude 50°, I find the difference of longitude 205, in distance column, adjoining to which, in the departure column, stands 157, the departure. Now, the difference of latitude 151, and departure 157, are found to agree nearest in the Table marked 46° at the bottom, which is the course, and the corresponding distance is 218 miles. Therefore, the course is S.46°W. and distance 218 miles.

CASE II.

The latitude sailed from, course and distance given, to find the other latitude arrived in, and difference of longitude.

NOTE.—The following general rule may be applied, not only in this case, but in any other case in middle latitude sailing, where the difference of longitude is required.

A GENERAL RULE.

1. By the common rules of Plane Sailing only, with the things given in the question, find the course, distance, difference of latitude, departure, latitude in, and middle latitude, or, at least you must find the middle latitude and departure.

2. Take the complement of the middle latitude as a course, in Table II. and find the departure in its column ; the number corresponding in the distance column will be the difference of longitude.

But, if you take the middle latitude as a course, (instead of its complement) you must look in a latitude column, for the nearest number to your departure, and the corresponding distance will be the difference of longitude, (the same as above.)

Examples.

I. A ship from latitude 42° 52′N. sailed S.W. by S. 250 miles. Required the latitude come to, and difference of longitude ?

The course 3 points, and distance 250 miles, gives the difference of latitude 207.9 miles, and departure 138.9.

Latitude sailed from, 42° 52′N.
Diff. lat. 207.9 miles, or 3 28 S.

Latitude come to, 39 24 N.

Sum of the latitudes, 2)82 16

Middle latitude, 41 08 Comp. mid lat. 48° 52′

Now under, the complement of the middle latitude 49°, as a course in Table II. I find the departure 138.9 in departure column ; corresponding to this, in the distance column, is the difference of longitude sought, 184 miles.

II. A ship from a Cape in latitude 36° 58′N. and longitude 76° 17′W. sailed N.E. by E. and by observation is in latitude 39° 10′N. Required the distance run, and longitude come to ?

Latitude of the Cape, 36° 58′N. 36° 58′N.
Lat. in, by observation, 39 10 N. 39 10 N.

Difference of latitude, 2 12=132m. Sum, 76 08

Middle latitude, 38 04

To the course 5 points, and difference of latitude 132 miles, the distance is 238 miles, and the departure 197.9 miles.

Now, under the complement of the middle latitude 52°, as if it were a course, I find the departure 197.9 in a latitude column, the corresponding distance is 251 miles the difference of longitude.

Longitude sailed from, 76° 17′W.
Diff. of long. 251 miles, or 4 11 E.

Longitude arrived in, 72 06 W.

III. Yesterday noon we were in latitude 43° 34′N. and longitude 35° 16′W. and have sailed till this day noon, as follows, viz. S.W. by W. 58 miles, S.W. 32 miles, and N.E. by N. 6 miles; I demand the latitude and longitude come to ?

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.W. by W.	58	- - - -	32.2	- - - -	48.2
S.W.	32	- - - -	22.6	- - - -	22.6
N.E. by N.	6	5.0	- - - -	3.3	- - - -
		5.0	54.8	3.3	70.8
			5.0		3.3
		D. Lat.	49.8	Dep.	67.5

The difference of latitude made good 49.8, and departure 67.5 are found to agree in their respective columns, nearest in page marked 54° at the bottom, which is the course made good, and the corresponding distance is 85 miles.

Latitude sailed from, 43° 34′N.
Difference of latitude 50 S.

Latitude come to; 42 44 N.

Sum of latitudes, 86 18
Middle latitude, 43 09

Under middle latitude 43°, I find the departure 67.5 in a latitude column, the distance answering thereto is 92 miles, the difference of longitude.

Longitude sailed from, 35° 16′W.
Difference of longitude, 1 32 W.

Longitude in, 36 48 W.

IV. A ship in latitude 30° 10′S. and longitude 60° 37′W. sailed 300 miles upon a direct course between the south and east, and, by observation, is found to be in latitude 34° 19′S. Required the course and longitude arrived in?

Ans. { Course S.E. by S.
Long. in 57° 20′W.

V. Yesterday noon we were in latitude 30° 25′S. and longitude 3° 04′W. since which we have sailed several courses, and find by the result of our Traverse table, that we have made good 150 miles northing, and 240 miles easting. Required our latitude and longitude in?

Ans. { Latitude in, 27° 55′S.
Longitude in, 1 30 E.

VI. A ship from latitude 43° 52′N. and longitude 68° 04′W. sails S. E ½E. till her departure is 105 miles. Required her present latitude and longitude?

Ans. { She is in latitude 42° 26′N.
The longitude in 65 40 W.

VII. A ship from latitude 40° 00′S. and longitude 1° 33′W. sails E. by S. 60 miles; then E. by N. 20 leagues. Required the latitude and longitude come to?

Ans. { The latitude in, 40° 00′N.
The longitude in, 1 00 E.

MERCATOR'S SAILING.

MERCATOR'S Sailing, so called from the inventor, is an easy, accurate method of resolving the several problems of sailing, upon the assumption that the figure of the earth is a perfect Globe.

Mr. GERARD MERCATOR, a Fleming, in 1556, published a Chart, applying the surface of a globe to a plane. This is an ingenious plan to ascertain the situations of places on the *globe*, upon a *plane*.—In this projection, the spherical surface of the earth is reduced to a plane, on which, the meridians, instead of converging to a point at the poles, are drawn on the Chart parallel to each other ; and the distance between the several parallels of latitude is enlarged, from the equator to the poles, in the same proportion as the degrees of longitude decrease, so as to conform to the spherical figure of the earth.

This enlarged difference of latitude, called MERIDIONAL DIFFERENCE OF LATITUDE, is obtained by Table III. which contains the Meridional Parts to every degree and minute of latitude. The degrees of latitude begin on the top, and the minutes in the side column.

To find the Meridional difference of latitude, between any two given latitudes.

RULE.

Take out of the Table, the meridional parts corresponding to each latitude, and subtract the meridional parts of the lesser latitude from the meridional parts of the greater ; the remainder will be the meridional difference of latitude, if both places be on the same side of the equator ; but if they be on different sides of the equator, the sum of the meridional parts will be the meridional difference of latitude.

EXAMPLES.

I. Required the meridional difference of latitude between Montock point, and Georgetown, Island of Bermudas.

Montock's latitude, 41° 04'N. Mer. parts, 2707
Georgetown's latitude, 32 25 N. Mer. parts, 2058

Meridional difference of latitude, 649

II. Required the meridional difference of latitude between Bermudas, and the Cape of Good-Hope, in latitude 34° 29'S.

Bermudas' latitude, 32° 25'N. Mer. parts, 2058
Cape of Good-Hope's lat. 34 29 S. Mer. parts, 2207

Meridional difference of latitude, 4265

CASE I.

TO SHAPE COURSES.

Or, to find the direct course and distance between any two places, whose latitudes and longitudes are known.

RULE.

1. Write down the latitude and longitude of the place, from which you wish to know the bearing and distance of the other place, whose latitude and longitude must be written under the former, taking care to leave a horizontal space between the latitudes and longitudes for the meridional parts; and take out of Table III. the meridional parts corresponding to each latitude. Then find the proper difference of latitude, the meridional difference of latitude and difference of longitude in miles between the two places.

2 Consider the meridional difference of latitude as if it were the proper difference of latitude, and the difference of longitude as the departure; then find the course by noting in the Tables under what points or degrees those numbers are found to correspond; with this course and the *proper* difference of latitude, find the corresponding distance, which will be the distance required.

Note.—If the numbers be too large to be found in the Tables, you may take the 10th, 20th, 30th, or 40th, &c. of the given number, as being the shortest and easiest method for seamen, and is sufficiently correct for finding the course.

Examples.

I. Required the direct course and distance from Montock point, to Georgetown, Island of Bermudas.

Montock's latitude,	41° 04′N.	Mer. parts,	2707	Long. 72° 01′W.
Georgetown's lat.	32 25 N.	Mer. parts,	2058	Long. 64 40 W.
	8 39	Mer. diff. lat,	649 m.	7 21
	60			60
Proper diff. lat.	519 miles.		Diff long.	441 miles.

Thus, $\frac{1}{10}$ of the meridional difference of latitude 64.9, and difference of longitude 44.1, are found to agree nearest under 34° with this course, and $\frac{1}{10}$ of the proper difference of latitude 51.9, is found to correspond to distance 63, this × 10 gives 630 miles; therefore the course is S. 34°E. or S.E. by S. nearly, and the distance 630 miles

II. Required the direct course and distance from Bermudas, to a Cape in latitude 34° 29′S. and longitude 18° 29′E.

Bermudas' lat.	32° 25′N.	Mer. parts,	2058	Long. 64° 40′W.
Cape's latitude,	34 29 S.	Mer. parts,	2207	Long. 18 29 E.
	66 54	Mer. diff. lat.	4265	83 09
	60			60
Proper diff. lat.	4014	Difference of longitude,		4989

Thus $\frac{1}{30}$ of the meridional difference of latitude 142.1, and $\frac{1}{30}$ of the difference of longitude 166.3, are found to agree nearest over 49°, and this course and proper difference of latitude, or $\frac{1}{30}$ of it 133.8, is found to correspond to distance 204, this multiplied by 30, gives the distance 6120 miles.

III. Required the true course and distance from a Lighthouse in latitude 32° 44′N. and longitude 80° 02′W. to Montock point, in latitude 41° 04′N. and longitude 72° 01′W.

Ans. The course is N. 38° E. or N.E. by N. $\frac{1}{2}$ E.
The distance is 635 miles.

IV. Required the course and distance from a Bay in latitude 42° 21′N. and longitude 70° 53′W. to a Port in latitude 55° 58′S. and longitude 67° 20′W.

Ans. Course S. 2° E.
Distance 5900 miles.

V. I demand the course and distance from latitude 42° 48′N. longitude 70° 46′W. to latitude 21° 12′N. longitude 70° 49′W.

Ans. The course is due South nearly.
The distance 1276 miles.

VI. I demand the course and distance from a Port in latitude 55° 58′ S. longitude 67° 20′W. to latitude 34° 29′S. and longitude 18° 29′E.

Ans. Course N. 70° E.
Distance 3760 miles.

REMARK.—When two places lie so near east and west from each other, that their difference of longitude is very great, with respect to their difference of latitude, and require a very large course, their distance may be found, perhaps, nearer the truth by middle latitude, Case I. than by Mercator's sailing.

EXAMPLE.

Required the course and distance from a place in latitude 32° 25′N. longitude 64° 48′W. to a place in latitude 33° 50′N. and longitude 78° 25′W.

Latitude	32° 25′N.	32° 25′	Long. 64° 48′W.
Latitude	33 50 N.	33 50	Long. 78 25 W.
	1 25	2)66 15	13 37 W.
	60		60
	—	Mid. lat. 33 07	——
Diff. lat.	85 m.		3)817 Diff. lon. in m.
			272

Thus, with the middle latitude, 33°, in Table II. and $\frac{1}{3}$ of the difference of longitude 272, found in distance column, answering to this in the latitude column stands 228.1, one third of the departure,—then with one third of the difference of latitude 28.3, and departure 228.1, I find the course 83°, and distance 230, which multiplied by 3 gives the distance 690 miles.

PARALLEL COURSES.

Any two places in the same parallel of latitude, being directly east and west from each other; hence the course is always known, and the distance may be found by the following rule.

RULE.

Find the latitude among the degrees in Table II. and in distance column the difference of longitude, opposite to which, in the column of latitude, is the distance required.

EXAMPLES.

I. Required the course and distance from a Cape in latitude 37° 00'N. longitude 76° 18'W. to an Island in latitude 37° 00'N. and longitude 25° 06'W.

Cape's longitude,	76°	18'W.
Island's longitude,	25	06 W.
Difference of long.	51	12=3072 miles.

Then with the latitude 37°, in Table II. and $\frac{1}{12}$ of the difference of longitude, 256 in distance column; answering to which in the column of latitude, stands 204.5, which × by 12 gives 2454 the distance required, the course being due east.

II. Required the direct course and distance from a Port in latitude 43° 40'N. longitude 70° 08'W, to a Port in latitude 43° 40'N. and longitude 65° 12'W. *Ans.* East 212.9 miles.

CASE II.

TO FIND THE DIFFERENCE OF LONGITUDE.

RULE

1. With the particulars given in the question, find the course, distance, difference of latitude and departure, by the common rules of Plane Sailing.

2. Apply the difference of latitude, to the latitude left, so as to find the latitude come to, and take out of the Table the meridional parts corresponding to each latitude, and subtract the less from the greater. If the latitudes be both of the same name, the remainder will be the meridional difference of latitude; but if the latitudes be of different names, take the sum of those parts for the meridional difference of latitude. Then find your true course either among the points or degrees, and in the same Table, find the meridional difference of latitude in latitude column; adjoining to which, in the departure column, will be the difference of longitude.

EXAMPLES.

I. A ship from Montock in latitude 41° 04'N. longitude 72° 01'W. sails S.E. by S. 210 miles. Required the difference of longitude made, and longitude arrived in.

Thus, by Plane Sailing, with the course 3 points, and distance 210 miles, I find the difference of latitude 174.6 miles, and departure 116.7 miles.

Montock's latitude,	41° 04'N.	Mer. parts,	2707
Diff. lat. 175 miles, or	2 55 S.	Mer. parts,	2480
Latitude in,	38 09 N.	Mer. diff. lat.	227

Under the course 3 points, I find the meridional difference of latitude 227 in the latitude column, the corresponding departure 151.7 is the difference of longitude.

Longitude left,	72° 01′W.
Difference of long.	2 32 E.
Longitude in,	69 29 W.

II. A ship from Bermudas sails N.E. ¼E. until she arrives in latitude 34° 06′N. Required her difference of longitude and longitude in ?

Latitude sailed from,	32° 25′N.	Mer. parts,	2058
Latitude arrived in,	34 06 N.	Mer. parts,	2179
Proper diff. latitude,	1 41	Mer. diff. lat.	121
	60		
	101 miles.		

The course 4¼ points and proper difference of latitude 101 give the distance 150, and departure 111.1 by plane sailing.

Then, I find the course 4¼ points, and meridional difference of latitude 121, in latitude column, answering to which, in departure column, is the difference of longitude 133 miles.

Bermudas' longitude	64° 40′W.
Difference of longitude,	2 13 E.
Longitude arrived in,	62 27 W.

III. A ship from latitude 50° 35′N. and longitude 2° 05′W. sailed 171 miles upon a direct course between the south and west, and by observation is found to be in latitude 48° 26′N. Required the course steered, and longitude come to ?

Latitude left,	50° 35′N.	Mer. parts,	3529
Latitude in, by obser.	48 26 N.	Mer. parts,	3331
Difference of latitude,	2 09=129	Mer. diff. lat.	198

The distance 171, and difference of latitude 129, are found to agree nearest under 41°, which is therefore, the course under which I find the meridional difference of latitude in latitude column, answering to which, in departure column stands 172 the difference of longitude ?

Longitude from,	2° 05′W.
Difference of longitude,	2 52 W.
Longitude arrived in,	4 57 W.

IV. A ship from Montock point, in latitude 41° 4′N. and longitude 72° 01′W. sailed S.S.E. 48 miles, S.W. by S. 54 miles, E. by S. 71 miles, N.E. 63 miles, and W.N.W. 50 miles. Required the latitude and longitude of the place come to ?

Courses.	Dist.	N.	S.	E.	W
S.S.E.	48	----	44.4	18.4	----
S.W. by S.	54	----	44.9	----	30.0
E. by S.	71	----	13.9	69.6	----
N.E.	63	44.5	----	44.5	----
W.N.W.	50	19.1	----	----	46.2
		63.6	103.2	132.5	76.2
			63.6	76.2	
Diff. latitude,			39.6	56.3	Dep.

The difference of latitude made good, by the result of my Traverse Table 39.6 and the departure 56.3, I find to agree nearly over 55°. Therefore the course made good is S 55°E and distance 69 miles.

Montock's latitude, 41° 04′N. Mer. parts, 2707
Difference of latitude, 40 S. Mer. parts, 2654

Latitude in, 40 24 N. Mer. diff. lat. 53

Now I find the course 55°, and the meridional difference of latitude 53, or nearest to it 52.8 in latitude column; answering to which in departure column is 75.4, the difference of longitude.

Montock's longitude, 72° 01′W.
Difference of longitude, 1 15 E.

Longitude arrived in, 70 46 W.

V. Yesterday at 12 o'clock the ship was in latitude 59° 10′N. and longitude 2° 14′W. since which, by our reckoning she has made good S.46°E. difference of latitude 156.2, and 162 miles departure; what difference of longitude has she made, and the longitude in?

Ans. { Difference of longitude 5° 5′E.
Longitude in, 2° 51′E.

VI. Yesterday by our reckoning, we were in latitude 1° 46′N. longitude 1° 10′E. since which, we find by the result of our Traverse Table, that we have made our course good S.41°W. difference of latitude 137.6 miles, and have departed 119.5 miles from the meridian; what difference of longitude has been made, and what longitude are we in?

Ans. { Difference of longitude 2° 00′W.
Long. in 0° 50′W. having crossed the first meridian.

* * *

Mercator's Chart is not to be considered as a just representation of the earth's surface; for on it the figures of islands and countries are apparently expanded as you approach the poles.

Suppose an island in the latitude 60°N. or S. where the breadth of a degree of longitude is just half as large as a degree upon the equator. Now, as the degrees of latitude are enlarged in proportion as the degrees of longitude are extended towards the poles, it is plain, that every point of that island or country, being laid down in its proper latitude and longitude, will be represented twice as large as it really is.

Hence it follows, that as the degrees of latitude are every where increased like those of longitude, it is plain the bearing between places will be the same on this chart as on the globe ; and the proportions between the latitude and longitude, and nautical distances, will be the same upon this chart as upon the globe.

And since the meridians in this projection are right lines, it follows, that the rhumbs, which form equal angles with the meridians, will be straight lines, which render this projection of the earth's surface much more easy and proper for the mariner's use than any other.

THE LOG-LINE AND HALF-MINUTE GLASS.

THE LOG is a flat piece of board, cut in the form of the quarter of a circle, having its circular side loaded with lead sufficient to make the angular part appear above the water. To the log, the log-line is fastened, which is divided into equal spaces called KNOTS. They are commonly counted, beginning at the distance of ten, twelve, or fifteen fathoms from the log. At the point of beginning there is commonly fastened a red rag, that it may be readily distinguished.

The distance detween the knots on the log-line is commonly made 10 fathoms, calling 5 feet a fathom ; thus making a knot 50 feet, to correspond with a glass which will run 30 seconds. The distance between each of these knots bears nearly, the same proportion to a nautical mile, that half a minute does to an hour.

But, some experienced commanders find that the allowance of 50 feet to a knot, generally makes the ship a head of the reckoning, and, to avoid danger, divide the log-line into knots of 7, or $7\frac{1}{2}$ fathoms of 6 feet each, to correspond with a glass that runs 28 seconds ; which of these methods is best, experience alone must determine.

When the glass is faulty, the log-line may be divided, as in the following Table, showing the length of the knots of the log-line for the time of different glasses.

Seconds of Glass.	Length of Knots in Feet.
24	40.0
25	41.8
26	43.4
27	45.0
28	46.8
29	48.4
30	50.0
31	51.8
32	53.4
33	55.0
34	56.8
35	58.4
36	60.0

NOTE.—In clear, dry weather, the glass runs out faster than it does in damp, or rainy weather ; therefore care should be taken to know how many seconds the glass runs, by comparing it with a good watch carrying a second hand.

Or, let a bullet be fastened to a silk thread and suspended by a nail ; let it be $39\frac{2}{5}$ inches from the nail to the middle of the bullet, and the bullet caused to swing ; each of these swings will be a true second of time.

Care should also be taken to measure the log-line often, lest it stretch and deceive you in the distance.

To correct the distance given by the log-line and half-minute glass.

When the log-line, or half-minute glass, or even both of them are faulty; the distance measured thereby, or the difference of latitude and departure resulting, may be corrected by the following

GENERAL RULE.

Multiply the distance run by the log, by 3 times the measured length of a knot, and divide the product by 5 times the measured time of the glass. This will give the true distance, cleared from errors of both log-line and glass.

EXAMPLE.

Suppose a ship runs 6 knots of a log-line of 49 feet to a knot, while a glass of 24 seconds is running out. What is the true rate of her sailing?

49×3 = 147, three times the measured length of a knot.
6 distance run per log.

24″×5=120)882(7.35 Ship runs per hour.

But the errors of the log-line and glass may be corrected by the following Table, more expeditiously, than by the foregoing general Rule.

TABLE

Of Proportional Numbers of the Log-Line and Glass.

Find the feet between the knots in the log-line, in the side column, and the seconds, which the glass runs, at the top, and in the angle of meeting is the proportional number sought.

Feet.	27″	28″	29″	30″	31″	32″	33″	34″
45	100	96	93	90	87	84	82	79
46	102	99	95	92	89	86	84	81
47	104	101	97	94	91	88	85	83
48	107	103	99	96	93	90	87	85
49	109	105	101	98	95	92	89	86
50	111	107	103	100	97	94	91	88
51	113	109	106	102	99	96	93	90
52	116	111	108	104	101	97	95	92
53	118	114	110	106	103	99	97	94
54	120	116	112	108	105	101	98	95

Use of the above Table in correcting the distance run, or the resulting difference of latitude and departure, when the log-line, glass, or even both of them are faulty.

RULE.

Multiply the difference of latitude and departure respectively, by the proportional number answering to the log-line and glass as above, and strike off the two right hand figures of each product; the remaining figures, on the left of the dash, will be the difference of latitude and departure, cleared from errors of both log-line and glass.

EXAMPLE.

The last 24 hours the ship hath sailed several courses and distances, and, by the result of the Traverse Table, the difference of latitude made good is 120, and departure 75 miles; but by examining the log-line and glass, I find them both faulty; as the line measures 48 feet between the knots, and the glass runs 32 seconds. Required the true difference of latitude and departure made good?

Diff. lat. by Traverse Table,	120	and departure,	75
Number in the Table,	90		90
True difference of lat.	108,00	True dep.	67.50

Which gives the true difference of latitude 108, and departure 67.5, cleared from errors of both glass and line.

TO FIND THE SUN'S DECLINATION.

THE Sun's Declination, is his apparent distance from the Equator, either North or South. The sun's declination is given in Table IX. for every noon at Greenwich, or London, and may be reduced to any other meridian by means of Table X. following the Table of Declination.

To find the Sun's Declination, at noon, at any place either in East, or West Longitude.

RULE.

1. After taking out the sun's declination for noon, at Greenwich, from Table IX. find the day of the month, or the nearest to it, in one of the side columns of Table X. and the nearest to the given longitude from Greenwich, at the top of the Table; opposite the former, and under the latter, will be the correction in minutes; which must be applied to the declination at Greenwich, to give the true declination at noon in your meridian.

2. To know whether the correction must be added to, or subtracted from the declination found in Table IX. take notice whether the declination, on the given day, be increasing or decreasing. This is readily known by inspection, observing whether the declination on the following day be greater or less than it is, on the given day; then observe the following rules, viz.

I. In West Longitude.

If the declination be { Increasing, add the correction.
Decreasing, subtract the correction.

II. In East Longitude.

If the declination be { Increasing, subtract the correction.
Decreasing, add the correction.

Or, the above rule may be rendered more general and concise as follows, viz.

If the declination be

Increasing, { Add in West.
Subtract in East.

Decreasing, { Subtract in West.
Add in East.

Remark.—When the correction found in Table X. is subtractive, and greater than the declination taken from Table IX. which may sometimes happen, you must subtract the declination from the correction, the remainder will be the correct declination, which will be of a different name from that taken from the Table; or, of the same name that is marked the next day after the given day.

Examples.

I. Required the Sun's declination at noon, 30th of May, 1814, in longitude 110 West?

The Sun's declination at Greenwich, May 30th, 1814,	21° 43'N.
Correction from Table X. for longitude 110 W.	+ 3
Sun's declination at noon, in longitude 110 W.	21 46 N

II. Required the Sun's declination on the 10th of September, 1827, in longitude 160 East?

Sun's declination at noon, at Greenwich, Sept. 10, 1827,	5° 11'N.
Correction from Table X. for longitude 160 E.	11
Declination at noon, in longitude 160 E.	5 22 N.

III Required the Sun's declination at noon, on the 23d of September, 1814, in longitude 170 West?

Declination at Greenwich from Table IX.	0° 5'N.
Correction from Table X. for longitude 170 W.	11
Declination at noon, in longitude 170 W.	0 6 S.

To reduce the Sun's declination from noon, at any meridian, to any other time under that meridian.

RULE.

Having reduced the Sun's declination at noon, at Greenwich, to noon under the given meridian, by the foregoing rule; enter Table X. with the time from noon, or nearest to it, at the bottom, and the day of the month in the side column, above the former, and opposite the latter will stand the correction, to be applied to that reduced declination. To know whether the correction be additive or subtractive, observe the following

RULE.

If the declination be

Increasing,	Add, afternoon. Subtract forenoon.	Decreasing,	Subtract, afternoon. Add, forenoon.

Examples.

I. Required the Sun's declination, May 20, 1814, at 6 o'clock, P.M. in longitude 160 West.

The Sun's declination at Greenwich, May 20th,	19° 54'N.
Correction from Table X. for longitude 160°W.	+ 6
True declination at noon, in longitude 160 W.	20 00
Variation of declination for 6h. from noon, May 20th,	+ 3
True declination May 20th, in long. 160 W. at 6h. P.M.	20 03 N.

II. Required the Sun's declination, April 30th, 1814, at 8 o'clock in the forenoon, in longitude 90° West?

The Sun's declination at Greenwich, April 30th is	14°	40′N.
Correction for longitude 90°W.	+	5
True declination at noon, in longitude 90°W.	14	45
Variation of declination for 8h. A.M. or 4h. from noon,	—	3
True declination April 30th, in long. 90 W. at 8h. A.M.	14	42 N.

TO WORK AN OBSERVATION.

Or, to find the latitude of the place by the meridian altitude of the Sun or Star.

RULE.

1. With your Quadrant well adjusted, take the altitude, or height of the sun's lower limb, above the horizon of the sea, when on the meridian; and to this altitude add 12 minutes,* and subtract the refraction, from Table IV, will give the altitude of the sun's centre.

2. Since the horizon is always just 90° from your zenith, therefore, subtract the altitude of the sun's centre from 90° 00′, and you will have the distance of your zenith (or point over head) from the sun's centre; which mark North, if you are to the northward of the sun, or South, if you are to the southward of the Sun, at the time of observation.

Place the declination under this zenith distance, then if they be marked with the same name, take their sum, but if of different names, take their difference, and you will have the latitude, which will always be of the same name as the greater quantity marked in either.

EXAMPLES.

I. January 20th, 1814, in longitude 90° 21′W. the meridian altitude of the sun's lower limb was observed to be 31° 25′ bearing south. Required the latitude?

Observed altitude, sun's L.L.	31°	25′S.
Dip and semi-diameter	+	12
Sun's apparent altitude,	31	37
Refraction,	—	2
Sun's true altitude,	31	35
	90	00
Zenith distance,	58	25 N.
True declin.	20	09 S.
Latitude in,	38	16 N.

Dec. at Greenwich, Jan. 20th,	20°	12′S.
Correction for longitude 90°W.	—	3
Corrected declination,	20	09 S.

Twelve minutes is here allowed to be the difference between the sun's semi-diameter and the dip of the horizon. The Sun's semi-diameter being 16 minutes additive, and the dip of the horizon, on board common sized vessels, being about 4 minutes subtractive.—Thus, +16—4=12.

II. April 30th, 1814, in longitude 60°E. the meridian altitude of the sun's lower limb was observed to be 52° 39′ bearing north. Required the latitude?

Observed altitude of the sun's L.L.	52° 39′N.
For dip and semi-diameter,	+ 12
	52 51
Refraction,	— 1
True altitude of the sun's centre,	52 50
	90 00
Zenith distance,	37 10 S.
Declination, reduced to long. 60°E.	14 37 N.
Latitude in,	22 33 S.

III. September 10th, 1815, in the meridian of Greenwich, the meridian altitude of the sun's lower limb was 89° 48′ bearing north. Required the latitude?

Observed altitude,	89° 48′N.
Dip and semi-diameter,	+ 12
	90 00
Refraction,	— 0
True altitude of the sun's centre,	90 00
Zenith distance,	0 00
The sun's true declination,	5 11 N.
Latitude in,	5 11 N.

Note.—When the sun is in your Zenith, or directly over head, the declination is the latitude in, and it is of the same name as the declination.

2. When the sun or star is on the equator, or hath no declination, the Zenith distance is the latitude of the place, and of the same name as the zenith distance.

Remark.—Adding 12 minutes to the observed altitude, for semi-diameter and dip, as in the foregoing Rule, is commonly practised by seamen, but if the height of the eye above the surface of the sea, be more than 20 feet, you may observe the following

RULE II.

To the observed altitude of the sun's lower limb, add 16 minutes, and from this sum subtract the dip and refraction, from Tables IV. and V. and you will have the true altitude; with which, and the declination, find the latitude as in the Rule foregoing.

IV. Being at sea on the 20th of December, 1808, in longitude 60°W. observed the altitude of the sun's lower edge 30° 41′ bearing south of me, the eye being 40 feet above the surface of the sea. Required the latitude?

Observed altitude,	30°	41′
Sun's semidiameter,	+	16
	30	57
Dip of horizon 6′, and refraction 2′,	—	8
True altitude of the sun's centre,	30	49
	90	00
True Zenith distance,	59	11 N.
True declination,	23	27 S.
Latitude in,	35	44 N.

V. March 25th, 1822, in longitude 150°W. while the height of the eye was 30 feet, the meridian altitude of the sun's lower limb was observed to be 67° 20′ bearing north. Required the latitude?

Ans. 20° 38′S.

VI. June 20th, 1815, in longitude 70°W. while the height of the eye was 26 feet, the meridian altitude of the sun's lower limb was observed to be 80° 10′ bearing north. Required the latitude?

Ans. 13° 48′N.

To obtain the latitude from the meridian altitude of a star, you need only subtract the dip and refraction, from the observed altitude, and you will have the true altitude, with which, and the star's declination in Table XI. find the latitude as in the foregoing Rule.

EXAMPLE.

Being at sea on the 4th of January, 1810, I observed the altitude of the star Aldebaran, or the Bull's eye, to be 70° 10′ when on the meridian, bearing south of me; the height of the eye being 25 feet. Required the latitude?

Star's observed altitude,	70°	10′
Dip and refraction from Table IV. and V.	—	5
Star's true altitude,	70	05
	90	00
Zenith distance,	19	55 N.
Star's declination from Table XI.	16	07 N.
Latitude in,	36	02 N.

To work a back Observation.

RULE.

From the altitude of the sun's lower limb, subtract the semidiameter, add the dip, and subtract the refraction, and you will have the altitude of the sun's centre; which subtract from 90° will give the true Zenith distance, with which, and the declination, find the latitude as in the foregoing Rules.

EXAMPLE.

By a back observation with the Quadrant, the apparent altitude of the sun's lower edge was 27° 12′, when the declination was 24° 16′S. and the eye of the observer 28 feet above the horizon; the sun bearing south. Required the latitude of the place of observation?

Ans. Lat. 38° 45′N.

NOTE.—Many stars are always above the horizon of certain places of the earth; and, in very high latitudes, especially near the time of the sun's greatest declination, as it is in the month of June, &c. the sun continues above the horizon for several days, and may be observed twice in 24 hours, viz. once at noon, and again when it comes on the meridian below the pole; and in this case the latitude is to be found by the following

RULE.

Add the complement of declination to the true meridian altitude; the sum is the latitude, and is of the same name as the declination.

EXAMPLES.

I. On January 4th, 1810, an observer, 16 feet above the surface of the water, finds the altitude of the north star, when on the meridian below the pole, to be 38° 25′, by a fore observation. Required the latitude?

Star's observed altitude,	38° 25′
The dip 4′ and refraction 1′,	— 5
True altitude,	38 20
Complement of declination,*	1 42
Latitude in,	40 02 N.

II. On the 20th of June, 1814, in a high northern latitude, and in longitude 60°W. the eye being 19 feet above the surface of the water, I observed the altitude of the sun's lower limb, on the meridian below the pole, 10° 12′. Required the latitude?

Observed altitude,	10° 12
Sun's semidiameter,	+ 16
	10 28
Dip 4′ and refraction 5′	— 9
True altitude of sun's centre,	10 19
Complement of declination,	66 33
Latitude in,	76 52 N.

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* *To find the complement of the declination, subtract the declination from* 90°.

TO WORK A DAY'S WORK.

THE working a day's work, as it is called, is the finding the direct course, distance, difference of latitude, departure, and difference cf longitude which a ship makes in 24 hours, deduced from courses steered and distance run by the log; so that having the latitude and longitude the ship was in, the day before, given, we can determine the latitude and longitude she is in to day; which is the ultimate object of a sea reckoning, commonly called the SHIP'S RECKONING.

The *sea day* begins at noon, and ends at noon; the end of the sea day and the noon of the *civil day* are at the same time.

Therefore every day, at noon, which is the end of the sea day, the Log-board, of which the following is the form, is transcribed into the Log-book.

FORM OF THE LOG-BOARD.

	H	K	F	Courses.	Winds.	Lee Way	Transactions.
Afternoon.	2	4	5	S.W.	N.E.	0	
	4	4	5				Moderate gales and cloudy.
	6	5					
	8	5					
	10	5					At 10 P.M. saw a ship to the
	12	5		E.N.E.	N.W.	½	northward.
Forenoon.	2	5					
	4	5					
	6	4	5				At 5 A.M. set top-gallant sails.
	8	4		S.W.	W.N.W.	2	At 8 A.M. top-gallant sails han-
	10	4	1				ded, and close reefed top-sails
	12	3	5				No observation.

The first column, marked H. contains the hours of the day, marked 2, 4, 6, &c. because on board merchant's ships in general, the log is hove only at every 2 hours; but on board ships of war, and vessels bound on long voyages, as Indiamen, &c. the log is hove every hour, and so marked on their log-board.

The columns marked K. and F. are for the knots and fathoms, or knots and tenths, the ship runs; determined by heaving the log.

Having transcribed the log-board, write down every thing requisite to be known in a day's work, as follows, viz.

Course made good,
Distance,
Difference of latitude,
Departure,
Latitude in,
Difference of longitude,
Longitude in,

Having written down every particular, required to be known, they may be readily found by the following

RULE.

1. Make a Traverse Table, in the same manner as taught in Traverse sailing.

2. Correct each course steered by the compass, for its variation and for lee-way, if any, and set them in your Traverse Table in their proper column.

3. Find the distance run on each course, by summing up the knots and fathoms, and doubling them, which place in the Traverse Table opposite to its course.

4. Work the Traverse, as in traverse sailing, finding the direct course and distance ; which place against their respective marks in the column of result of a day's work.

5. Take the difference of latitude made good, in the Traverse Table, and apply it to yesterday's latitude, or latitude left, according to former rules, and you will have the latitude in to-day.

To find the Difference of Longitude.

Take the latitude in yesterday, and latitude in to-day, add them together, take half their sum, and you will have the middle latitude,

Then with the middle latitude as a course, in degrees, in Table II. and your departure in latitude column, find the corresponding distance, which will be the difference of longitude.

Or, with the course, and meridional difference of latitude, you may find the difference of longitude, by Mercator's Sailing, as in Case II. page 30.

For the Longitude in.

Take the difference of longitude to-day, and apply it to yesterday's longitude, or longitude left, and you will have the longitude in.

EXAMPLES.

Yesterday noon, we were in latitude 36° 40′N. longitude 60° 40′W. since which we have sailed as per log-book ; what is the ship's direct course, and distance made good for the 24 hours, and what latitude and longitude has she arrived in ?

LOG-BOOK.

H	K	F	Courses.	Winds.	Lee Way	Rem. on board	Result of day's work.
2	6	5	S. by W.	West.	0		
4	6	5					
6	6	5					Course made
8	5	5					good, S.19°E.
10	5	5					Distance, 110 m.
12	5	5					Diff. lat. 104 S.
2	5		S.E. by E.	S.W.	0		Dep. 36 E.
4	5						Lat. in, 34° 56′N.
6	5						Diff. long. 44 E.
8	5						Long. in, 59° 56′W.
10	5						
12	5						

Yesterday's lat.	36° 40′N.
Diff. latitude,	1 44 S.
Latitude in,	34 56
Sum,	2)71 36
Middle latitude,	35 48
	Diff long. 0° 44′E.
Yesterday's lon.	60° 40′W.
Longitude made,	0 44 E.
Longitude in,	59 56 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S. by W.	72		70.6		14.0
S.E.by E.	60		33.3	49.9	
				14.0	
			103.9	35.9	

II. Yesterday noon, we were in latitude 15° 40′S. longitude 10° 15′ E. since which we have sailed as per log-book; what is our present latitude and longitude?

LOG-BOOK.

H	K	F	Courses.	Winds.	Lee Way	Rem. on board	Result of day's work.
2	4		S.E.by E.	West.	0		
4	4					These 24 h.	Course made
6	4					commencewith	good, S.49°E.
8	5					fine breezes &	Distance, 113m.
10	5		S.E.	W. by S.	0	pleasant wea-	Diff. lat. 74 S.
12	5					ther,	Departure, 86 E.
2	5						Lat. in. 16° 54′N.
4	5						Diff. long. 90 E.
6	5		S.E. ¼ E.		0		Long. in, 11° 45′E.
8	5						
10	5						
12	5						

Yesterday's lat.	15° 40′S.
Diff. lat. made,	1 14 S.
Latitude in,	16 54 S.
Sum,	32 34
Middle lat.	16 17
	Diff. long. 90 E.
Long. left,	10° 15′E.
Diff. long. made,	1 30 E.
Longitude in,	11 45

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.E.by E.	34		18.9	28.3	
S.E.	40		28.3	28.3	
S.E. ¼ E.	40		26.9	29.6	
			74.1	86.2	

III. Yesterday at noon, we were in latitude 34° 18′N. longitude 52° 10′W. since which, we have sailed till this day noon, as per log-book; what is our present latitude and longitude?

LOG-BOOK.

H	K	F	Courses.	Winds.	Lee Way	Rem. on board	Result of day's work.
2				Calm.		These 24 h.	
4						com. with thick	
6						weather and	Course N.W by W.$\frac{3}{4}$W.
8						calm.	Distance, 84 m.
10	3		N.W.$\frac{1}{2}$W.	N. by E.	$\frac{1}{2}$	At 8 P.M a	Difference lat. 36 N.
12	3					light breeze	Departure, 75 W.
2	3					from the east.	Lat. in, 34° 54'N
4	3					At 4 A.M. fresh	Diff. long. 1 32 W.
6	7	5	W.	N.N.W.	2	gales from N.N.	Long. in, 53 42 W,
8	7	5				W, which con-	
10	7	5				tinue the rest	
12	7	5				of the day.	

Yesterday's lat.	34°	18'N.
Difference lat.		10 S.
Latitude in,	34	08 N.
Sum,	69	12
Middle lat.	34	36
Diff. long.	1°	31'W.
Yesterday's lon.	52°	10'W.
Diff. long.	1	31 W.
Longitude in,	53°	41'W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
N.W.bW.	24	13.3			20.0
W.S.W.	60		23.0		55.4
			13.3		
			9.7		75.4

The lee way being allowed upon each course, the Traverse Table will be as above.

IV. Yesterday at 12 o'clock, we were in latitude 36° 25'N. longitude 61° 36'W. since which we have sailed till this day noon as per log-book. I demand the direct course and distance made good, also our present latitude and longitude, and the bearing and distance of Georgetown, Island of Bermuda, in latitude 32° 25'N. aud long. 64° 40'W.

LOG-BOOK.

H	K	F	Courses.	Winds.	Lee Way	Rem. on board	Result of day's work.
2	4		S.S.W.	S.E.	$\frac{1}{2}$	These 24 hs.	
4	4					first part mod-	
6	5					erate breezes,	Course made
8	5	5	West.	S.S.W.	1	and hazy; lat-	good, S.13°E.
10	5	5				ter part fresh	Distance, 54 m.
12	5	2				gales with rain.	Difference lat. 53 S.
2	5	4	S.S.E.	S.W.	1	At 6 A.M. spoke	Departure, 12 E.
4	5	2				ship Neptune,	Lat. in, 35° 32'N.
6	6	4				from N. Prov-	Diff. long. 15 E.
8	6	5				dence, bound	Long. in, 62° 21'W.
10	7	5	E. by S.	S.S.E.	1$\frac{1}{2}$	to Halifax.	
12	7	5					

Yesterday's lat.	36° 25'N.
Difference lat.	53 S.
Lat. in to day,	35 32 N.
Middle latitude,	35 58
Diff. long.	0° 15'E.
Yesterday's lon.	61° 36'W.
Diff. longitude,	0 15 E.
Long. in,	61 21 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E	W.
SSW.½W.	26		22.9		12.3
W. by N.	32	6.2			31.4
S.E. by S.	47		39.1	26.1	
E.b.N½E.	30	2.9		29.9	
		9.1	62.0	56.0	43.7
			9.1	43.7	
			52.9	12.3	

Island of Bermuda, Georgetown, bears S 32°W. distance 221 miles.

KEEPING A JOURNAL AT SEA.

KEEPING a Journal of a voyage at sea, is duly connecting, and orderly entering each day's work of the ship's run, and other necessary remarks of her voyage in continuation; in which observe as follows:

1. That the sea day begins at noon, and ends at noon, and that the noon of the civil day is the end of the sea day, which is consequently 12 hours earlier than the civil account of time; thus a day's work marked Monday, August 4th, began on Sunday at noon, and ends on Monday at noon; which corresponds with the sun's declination for the 4th of August, being calculated for noon of the civil day.

2. When a ship is bound from one place to another, and is obliged to go out of sight of land, for any considerable length of time, at leaving sight of it, the ship is said to take her departure; and the captain or mate ought to take the bearing of such land only, whose latitude and longitude are known, from which the departure is to be taken; estimating the distance according to judgment; this bearing and distance is to be noted in the log-book, against the time it was taken.

3. Lee-way must be allowed upon all courses on which it is made, in the following manner, viz. If the larboard tacks be on board, allow the lee-way to the right hand; but if the starboard, allow it to the left hand.*

---

* The lee-way is readily discovered by means of an Azimuth Compass, being turned in such a manner that you can see the ship's wake over the parallel to the two sights; for the difference between the course steered, and the ship's wake, will be the lee-way she makes. The same thing may be done, and perhaps more readily, by fixing a small compass cut in lead, or other metal, on the poop, or some convenient part of the ship's stern, with the meridian parallel to the ship's side having a pin in the centre, to which is made fast a small line of sufficient length, with a piece of wood at the end, that it may be dragged after the ship; this being hove over, the point cut by the line on this small compass being the difference between the course steered, and the one actually sailed, is the lee-way made by the ship. These methods of ascertaining the lee-way may be tried as often as is thought proper, or its quantity may be estimated according to judgment, by the officer of the watch, and always noted against the respective course on the log-board, at the time of such observation, or judgment.

4. The variation of the compass, if any, must be allowed upon all courses steered, and departures taken in the following manner, viz. If the variation be westerly, it must be allowed to the left hand, but if easterly, to the right hand, supposing yourself in the centre of the compass.

5. Currents and heave of the sea, are to be considered as courses and distances, and are to be set in the Traverse Table, and worked with the rest of the day's work.

6. When a great sea sets after the ship, usually allow one mile over, in ten, to the distance given by the log, and more or less according to the greatness of the swell. It is always safer to have the reckoning ahead of the ship, than the ship ahead of the reckoning.

7. Try your log-line and glass often, that you may not be deceived in the length of the one, or the measure of the other; for the line will shorten by being wet, and the glass run slower in damp weather.

RULES FOR CORRECTING THE DEAD RECKONING,

BY AN OBSERVATION.

Notwithstanding the rules already laid down for keeping a ship's way at sea, yet by reason of several accidents that may attend a ship in one day's run, such as swelling seas, different rates of sailing between the times of heaving the log, want of care at the helm, lee-way, accidental currents, sudden squalls, &c. the latitude by account and by observation may very often differ, in which case, you may correct as follows.

CASE 1.

To correct for a single day, or, when you have an observation every day.

RULE.

First by an examination, endeavour to find out which, or how many of the particulars above mentioned, the error in latitude probably arises from, and correct the difference of latitude and departure by account, accordingly, for each and every apparent cause of error, as far as you can discover them; and this departure, so corrected, call your true departure.

But, when, on careful examination, it appears that the error did not proceed from lee-way, currents, or heave of the sea, &c. or that they have already been reasonably estimated in the Traverse Table, you need not correct your departure by dead reckoning at all, but may set it down for your true departure; then with this departure and true difference of latitude between the two observations, find the course and distance, which will be the true course and distance made good. And, with the middle latitude and the departure as above, find the difference of longitude; which will be the true difference of longitude.

Or, with the course found as above, and meridional difference of latitude between the two observations, find the difference of longitude by Mercator's Sailing.

CASE II.

TO CORRECT FOR SEVERAL DAYS.

When an observation has been wanting for several days, you may correct the longitude by the following

RULE.

First, on the day when the last, or present observation is taken, complete the whole day's work by dead reckoning, as though you had no observation.

Then, carefully examine every day's work by D.R. since last observation, and if you judge that all reasonable allowances for currents, lee-way, heave of the sea, &c. have been already sufficiently made, you need not correct your longitude in, by D.R. at all, but may consider it as your true longitude; or at least more likely to be true, than if it were altered by any further attempt to correct it.

But, if on examination you find that further allowances ought to be made for lee-way, current, heave of the sea, &c. take out the difference of latitude and departure, for each of them, and find how much this extra departure amounts to; with which, and the middle latitude, already found, find how much difference of longitude it will give, this portion of longitude, applied to the longitude in by D.R. will give the correct or true longitude in.

An explanation of the foregoing Rules.

By the foregoing method of correcting, the departure by dead reckoning undergoes no further correction than that which is produced by discoverable causes, such as currents, heave of the sea, errors in the log-line and glass, &c these allowances being made, will either increase or diminish the departure in proportion as they affect it; and this departure, so corrected may be taken for your true departure, notwithstanding there may still exist a considerable difference between the latitude, corrected by these allowances, and that which is given by observation. If after all the allowances above mentioned, have been made, and there is still a difference between the latitude so corrected, and that given by observation, the remainder of the error is preserved in the course, or distance, or in both. Hence it may be inferred as follows, viz.

1. When a ship sails near the meridian, the principal part of the error is, probably in the distance run, because, in this case, it will require a sensible error in the course, to make any considerable error in the difference of latitude.

2. When a ship sails near the middle of the quadrant, or between 3 and 5 points from the meridian, it is then reasonable to conclude there is an error in both course and distance.

3. When the course is very large, or more than 5 points from the meridian, it is then most likely that the greatest part of the error is in the course, as, in this case, it will require a great error in the distance, to make any considerable one in the difference of latitude.

In either of the above cases, if the true difference of latitude between the two observations and departure, by account, be taken to find the course and distance, they will divide the error between the course and distance in a gradation proportionable to the course, whether the course be great or small; that is, if the course be small, the greatest part of the error will fall to the distance; but if the course be large, the greatest part of the error will be hove on the course.

If the difference of latitude between the two observations be greater than the difference of latitude made by account, as it is when the ship outruns her reckoning, it is presumed the ship hath sailed somewhat nigher the meridian, and likewise outrun the distance given by the log, and that in proportion as the course is great or small, as above mentioned, by means of which she has made more difference of latitude, as appears in the annexed figure 1.

Admit a ship, according to dead reckoning, hath made her course and distance from A, to B, and her departure B, E, but by observation she is found in the parallel of latitude C,D, this error being averaged between the course and distance, according to the method above mentioned, it will bring the ship at C, which is a less course, and somewhat greater distance, and gives the same departure as the greater course and less distance A,B, which was given by dead reckoning.

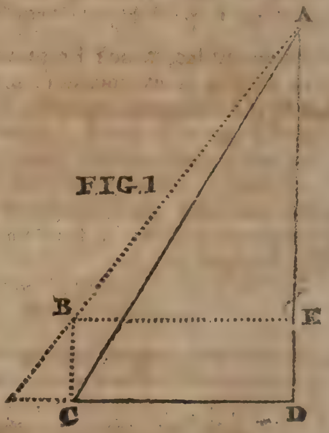
FIG.1

But if the reckoning hath outrun the ship, we conclude the ship hath made a larger course, and somewhat smaller distance, as appears in the annexed Figure 2.

A ship according to dead reckoning hath made her course and distance from H, to K, and her departure by dead reckoning K, M, but by observation she is found in the parallel of latitude I,L. This error being averaged as above, brings the ship at I, making a larger course, and smaller distance than by dead reckoning, but still keeping the same departure.

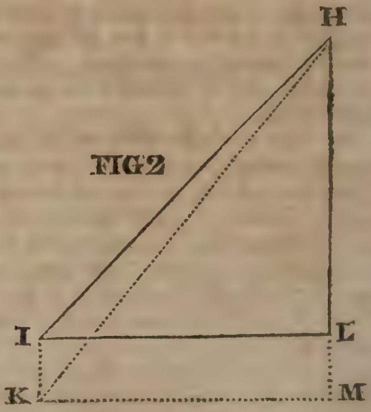
FIG2

But, since a smaller course, with a little larger distance, will give the same departure, as a larger course and a little smaller distance, the departure by account will neither be increased nor diminished in either case, but will continue the same.

Whether the whole of the error in latitude, or any part thereof, be attributed to an error in the course and distance, the difference of latitude between the two observations will always be the true difference of latitude; and by correcting this with the departure by account, or with the corrected departure, when other allowances have been made, will always regulate the course and distance, by dividing the error between them, according to the wideness of the course from the meridian.

And since in this case the departure by account, or otherwise corrected, is most probably the true departure, the longitude inferred therefrom is probably the true longitude.

These Rules, which I discovered in the year 1799, and ever since have taught, in my course of instruction, will be applied and exemplified in the following Journals.

JOURNAL

OF

A NOMINAL VOYAGE FROM NEW-LONDON TO BERMUDAS,

IN THE CHARLOTTE, OF LIVERPOOL;

A. B. MASTER; KEPT BY C. D. MATE.

Departure taken from Montock point, in latitude 41° 04′N longitude 71° 57′W. bound to Georgetown, Bermudas, in latitude 32° 25′N. longitude 64° 40′W.*

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Sunday, May, 4.
2						These 24 hours commence with light breezes from W. by S. At 2 P. M. wind from the northward, fresh, and at 4 P.M. Montock point bore N. W. distant 2 leagues; from which I take my departure, latitude 41° 04′N. longitude 71° 57′W.
4						
6	5	4	S.E by S.	W.N.W.	0	
8	5	4				
10	5	5				
12	5	5				
2	5	5				
4	5	5				
6	5	4				
8	5	3				
10	5	3				At 8 A.M. saw several sail standing to the eastward.
12	5	2				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.34°E.	114	94	64	39° 30′	39° 29′	84	70° 33′

Montock's lat.	41° 04′N.	
Diff. lat. made,	1 34 S.	
Latitude in,	39 30 N.	
Middle latitude,	40 17	
		Diff. long. 84 E.
Montock's long.	71° 57′W.	
Diff. long.	1 24	
Longitude in,	70 33 W.	

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.E.	6		4.2	4.2	
S.E. by S.	108		89.8	60.0	
			94.0	64.2	

---

* *Many masters of vessels state, that it is safest to run for Bermudas as in latitude* 30° 08′N. *and thus fall to the southward; as from the N.W. point a dangerous reef makes off. The longitude of Montock is varied in different Tables, from* 71° 57′, *to* 72° 06′W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Monday, May 5.
2	5	5	S.E. by S.	S.W.	1	
4	5	5				Fresh gales from S.W. all these 24 hours.
6	6					
8	6					
10	6					At 6 P.M. spoke the Ann, of Norwich, from Barbadoes.
12	6					
2	6					
4	6	5				
6	6	3				
8	6	2				At 10 A.M. saw several sail to leeward, standing to the northward.
10	6					
12	6					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.E.	144	102	102	37° 48′	37° 49′	131	68° 22′

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Tuesday, May 6.
2	4		S. by E.	E.N.E.	1	These 24 hours commenced with light winds, and pleasant weather.
4	4					
6	4					
8	4					
10	4					
12	4	5				At 12 o'clock, fresh gales and rain.
2	7		S.E. by E.	S.W.	0	
4	7					
6	7					At 10 A.M. more moderate, clear and pleasant. Saw several sail to leeward, standing to the northward.—Thus end these 24 hours.
8	7					
10	6	5	S.W. by S.	S.E.	½	
12	6	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.36°E.	106	86	63	36° 09′	36° 24′	79	67° 03′

Yesterday's latitude, 37° 49′N.
Diff. latitude to-day, 1 40 S.

Latitude in, by D.R. 36 09 N.

The latitude by D.R. differs 15 miles from the latitude by observation. I correct by Case I. in D. R.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
South.	49		49.0		
S.E. by E.	56		31.1	46.6	
SW.bS½W.	26		20.1		16.5
			100.2	46.6	16.5
				16.5	
				30.1	

By an examination I find that the lee-way hath been reasonably allowed, and the log-line and half minute glass are both right. I still make further attempts to examine the error, by some discoverable cause ; and having found the ship's place on the chart, for yesterday-noon, I find we have sailed in the Gulf stream these last 24 hours, in a current setting E.N.E. at least 1½ miles per hour, which is probably the cause of the error in latitude ; I therefore proceed as follows :

	N.	S.	E.	W.
Difference of latitude made by D.R.		100.2	30.1	
Current's motion E.N.E. 36 miles.	13.8		33.3	
		100.2	63.4	Dep. for cur.
		13.8		
Diff. latitude, corrected for current,		86.4		

Yesterday's latitude, 37° 49′N.
Corrected diff. latitude, 1 26 S.

Agreeing within 1 mile with the latitude by observation. With true difference of latitude 86, and corrected departure 63.4, the course made good is found S.36°E. and distance 106 miles.

Lat. by obs. yesterday, 37° 49′N.
Lat. by obs. to-day, 36 24 N.

Sum, 74 13

Middle latitude, 37 06

With middle latitude 37°, and corrected departure 63.4, the difference of longitude is found 79 m.

Yesterday's longitude, 68° 22′W.
Diff. long. to-day, 1 19

Longitude in, 67 03 W.

H	K	F	Courses.	Winds.	Lee Way	Remarks on board, Wedn. May 7.
2	3	5	E.¼S.	S.S.W.	0	Light breezes from the western board these 24 hours.
4	3	5				
6	3	5				At 6 P.M. spoke brig Rising Sun, from London, bound to Charleston.
8	3	5				
10	3					
12	3					A moderate current setting N.E. by E. for which I allow 7 miles these 24 hours.
2	3	5				
4	3					
6	3					
8	3	5				At noon, Georgetown bore S.7°E. distant 241 miles.
10	3	5				
12	3	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
			E.	N.	N.	E.	W.
East.	86	00	86	36° 24′	36° 24′	106	65° 17′

The result of this day's Traverse gives the course made good directly E. and the distance 85.7 miles; consequently the ship has not altered her latitude; therefore, with the latitude in 36°, and departure 86, in the column of latitude, the corresponding distance is 106, which is diff. long.

Yesterday's long. 67° 03′W.
Diff. long. to-day, 1 46 E.

Longitude in, 65 17 W.

Traverse Table.

Courses.	Dist.	N.	S.	E.	W.
E.¼S.	80		3.9	79.9	
N.E.byN.	7	3.9		5.8	
		3.9	3.9	85.7	
		3.9			
		0.0			

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Thursday, May 8.
2				Calm.		These 24 hours commence with a calm, which continues till 6 P.M.
4						
6						
8	3		S. ½ E	E.S.E	½	Light wind.
10	3					
12	3					
2	3					
4	3					
6	3					At meridian, Georgetown bore S. 10°E. distance 182 miles.
8	3					
10	3					
12	3					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
				N.	N.		W.
South.	60	60	00	35° 30′	35° 24′	00	65° 17′

Having but one course in this day's run, it needs no Traverse; and correcting this course for lee-way, it is found to be due south; therefore, the ship has altered her latitude, but not her longitude. But by observation the ship is found to be in lat. 32° 24'N. It is plain she has got 6 miles ahead of her reckoning, and it is evident that the difference of latitude, between the two observations, is both the true difference of latitude, and true distance.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Friday, May 9.
2	4		S.E.	S.S.W.	½	These 24 hours begin with steady
4	4					breezes and fair weather.
6	4					At 2 P.M. fresh gales and rain.
8	4	5				
10	4	5				At 6 A.M. spoke the schooner Beaver,
12	4	5				from Bermudas, bound to Boston.
2	5					
4	6		S.E. by E.	S. by W.	0	At 10 A.M. clears off pleasant, still
6	6					blows fresh.
8	6	5				At meridian, Georgetown bore S.
10	6	5				44°W. distance 114 miles.
12	6	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N	E.	W.
S 48°E.	145	97	108	34° 10'	33° 37'	132	63° 05'

Yesterday's lat.	35°	24'N.
Diff. lat. by acc't	1	14 N.
Lat. in, by D.R.	34	10 N.
Lat. by obs.	33	47 N.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.E.½E.	61		38.7	47.1	
S.E.byE.	63		35.0	52.4	
			73.7	99.5	

Latitude by observation not agreeing with the latitude by account, I proceed to account for that difference, and, on measuring the log-line, find it truly divided, to correspond with a glass that runs 30", but examining the glass, find it runs only 27", and on further examination find we have been sailing in a current setting S. by W. 5 fathoms, or half a mile per hour, for these 24 hours. I therefore first correct for the error of the glass.

The number in the Table, page 34, is	111		111
Difference of latitude by D.R.	74	Dep. by do.	99
Product,	82,14		109,89
Diff. lat. freed from error of the glass,	82 S.	and Dep.	110 E.
Current's motion S. by W. 12 miles, diff. lat.	12 S.	Dep.	2W.
Difference of latitude corrected for current, &c.	94 S.	Cor. dep.	108 E.

Yesterday's lat. 35° 24′N.
Corrected diff. lat. 1 34 S.

Latitude in, 33 50

Agreeing with the latitude by observation, within 3 miles.

With the true difference of latitude between the two observations, 97 miles, and corrected dep. 108, the true course is found S. 48°E. distance 145 miles.

Lat. by obs. yesterday, 35° 24′N.
Lat. by obs. to-day, 33 47 N.

True diff. latitude, 1 37=97′

Sum of latitude, 2)69 11

Middle latitude. 34 35

With the middle latitude 35°, and corrected departure 108, the correct difference of longitude is found 132 miles.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Saturday, May 10.
2				Calm.		The first 6 hours calm and foggy; then fresh gales and clear.
4						
6						
8	4		S.E.½E.	S.S.W.	½	A current setting S.S.E. ½ a mile per hour, all day.
10	4					
12	5					
2	5					A great swell from the S. by W. for which I allow 6 miles.
4	5					
6	5	5				
8	5	5				At meridian, Georgetown bore S. 83°W. distant 114 miles.
10	5	5	SE,bE½E.	South.	½	
12	5	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.54°E.	104	61	83	32° 56′	32° 46′	98	61° 27′

Yesterday's lat. 33° 47′N.
Difference of latitude, 51 S.

Latitude in, by D.R. 32 56 N.
Latitude in, by obs. 32 46 N.

In this day's work, the latitude, by observation, differs from the latitude by account, 10 miles, and having examined the log-line and glass, find them both right. The lee-way, current, and heave of the sea being already estimated in the Traverse Table; therefore, the difference, it is presumed, arises from an error, both in course and distance; therefore, with the true difference of latitude, between the two observations, and the departure by account, which in this case, is considered as the true departure, find the course, distance, and difference of latitude as follows, by Case I. for correcting, page 46.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.E. by E.	68		37.8	56.5	
E.S.E.	22		8.4	20.3	
S.S.E.	12		11.1	4.6	
N. by E.	6	5.9		1.2	
		5.9	57.3	82.6	
			5.9		
			51.4		

Lat. by obs. yesterday,	33° 47′N.
Lat. by obs. to-day,	32 46 N.
True difference of lat.	1 01=61m.
Sum of latitudes,	66 33
Middle latitude,	33 16

With the true difference of latitude 61, and departure 83, the correct course is found S.54°E. distance 104 miles.

With middle latitude 33°, and departure 83, the correct difference of longitude is found 98 m.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Sunday, May 11.
2	7		W.¾S.	S.E.		
4	7					These 24 hours, moderate weather and clear.
6	7					
8	7					
10	7					
12	7					
2	7					
4	7	5				At 8 A.M. made Georgetown, bearing due west; distance by estimation, 7 leagues; wind being fair, run directly in.
6	7	5				
8	7	5				
10						
12						

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.	N.	W.	W.
S.83°W.	172	21	162	32° 25′	32° 25′	193	64° 40′

The course and distance run by the log-book, and the bearing and distance of the land, being put into a Traverse Table, will give the result of the day's work as above, agreeing with the latitude and longitude of Bermudas.

JOURNAL

OF

A VOYAGE FROM BERMUDAS TO NEW-LONDON,

IN THE SHIP UNCAS, OF NEW-YORK,

WILLIAM VIGILANT, COMMANDER,

KEPT BY JAMES BOWER, MATE.

Departure taken from Georgetown, in latitude 32° 25'N. longitude 64° 40'W. bound to Montock Point, Long-Island, in latitude 41° 04'N. longitude 71° 57'W.; thence to New-London.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Monday, May 24, 1802.
2						These 24 hours commence with light breezes. Set top-gallant sails. A large swell setting N.W. At 1 P.M. sent the Pilot on shore. At 4 P.M. Georgetown bore S.S.W. ¼W. distant by estimation, 4 leagues, from which I take my departure, it being in latitude 32° 25'N. and longitude 64° 40'W. At meridian, cloudy and rainy. In top-gallant sails.
4						
6	4		NWby N.	S.E.	0	
8	4					
10	4					
12	4					
2	4					
4	4					
6	4	5				
8	4	5				
10	4	5				
12	4	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		N.	W.	N.		W.	W.
N.27°W.	90	81	42	33° 46'		50	65° 30'

Georgetown's lat.	32° 25'N.	
Diff. lat. made,	1 21 N.	
Lat. in, to-day	33 46 N.	
Sum of latitudes,	2)66 11	
Middle latitude,	33 05	
Diff. long.		50'W.
Georgetown's long.		64° 40'W.
Longitude in, to-day,		65 30 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
NNE.¼E.	12	10.8		5.1	
NW.b N.	84	69.8			46.7
		80.6		5.1	46.7
					5.1
					41.6

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Tuesday, May 25.
2	6		NW by N.	SWbyW.	1½	
4	6					These 24 hours, hard gales and squally.
6	6					
8			Lay to, up NW. off North, drift two miles per hour.	W.byS.	5	At 8 P.M. hove to.
10						
12						
2						
4						At 8 A.M. gale abated.
6						
8	7	5	N.W.	SW byW.	1½	Set the courses close reefed; more moderate.
10	7	5				
12	7	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
			W.	N.		W.	W.
N.byW.	96	94	18	35° 20′		22	65° 52′

The middle point between the ship's coming up, and falling off, while lying to, and then allowing the lee-way, the Traverse Table will stand as follows:

Yesterday's lat. 33° 46′N.
Diff. lat. made, 1 34 N.

Latitude in, 35 20 N.

Middle lat, 34 33
Diff. long. 0° 22′W.
Yesterday's long. 65° 30′W.

Long. in, to-day, by ac. 65 52 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
N.b.W.½W.	36	34.5			10.4
N.E.byN.	24	20.0		13.3	
NN.W.½W.	45	39.7			21.2
		94.2		13.3	31.6
					13.3
					18.3

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Wedn. May 26.
2	5		W.N.W.	North.	1	These 24 hours, fresh gales and clear weather.
4	5					
6	5					At 6 P.M. spoke sloop Success, from Newport, bound to Charleston.
8	5					
10	5					
12	5	5	N.W.	N.N.E.	1½	
2	5	5				We suspect a current setting North Easterly.
4	6					
6	6					
8	6	5				At noon, Montock bears N.31°W. distance 330 miles.
10	6	5				
12	6	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		N.	W.	N.	N.		W.
N.68°W.	134	50	124	36° 10′	36° 22′	153	68° 20′

Yesterday's lat. 35° 20′N.
Difference lat. 50 N.

Lat in, by D.R. 36 10 N.

Sum, 71 30

Middle latitude, 35 45
Diff. long. 153W.
Longitude in, by D.R. 68° 25′W

TRAVERSE TABLE.

Courses.	Dist.	N.	S	E.	W.
W. by N.	50	9.8			49.0
NWbW½W	85	40.1			75.0
		49.9			124.0

Here the latitude by observation, differs from the latitude by account, 12 miles.

1. By examining the log-book, I find on May 24th, there was a large swell setting N.W. for which there was no allowance made, on which, I now allow 6 miles.

2. By further examination, find on this day, May 26, a current setting N.E. about ½ a mile per hour, in which we have probably sailed, at least, these 24 hours, for which I correct as follows, by Case II. page 47.

24th, Swell setting N.W. 6 m. Diff. lat. 4 N. Departure 4 W.
26th, Current's motion N.E. 12 m. ——— 8 N. ——— 8 E.

Difference of latitude made by current, &c. 12 Dep. made by do. 4 E.

The middle latitude as above, 36°, and departure 4 miles, give difference of longitude 5 miles E.

Latitude by D R. 36° 10′N. Longitude in, by D.R. 68° 25′W.
Diff. lat. by current, &c. 12 N. Diff long. by cur. &c. 5 E.

Latitude in, corrected, 36 22 N. Cor. or true long. in, 68 20 W.
Agreeing with the observation.

H	K	F	Courses.	Winds.	Lee Way	Remarks on board, Thurs. May 27.
2	6		N.W.bN.	N.E.byN.	½	Fresh gales and clear weather.
4	6					
6	6					At 4 P.M. spake ship Truxton, from
8	6					New-York, bound to Martinico.
10	6					
12	6					
2	6					At 10 A.M. cloudy and rain.
4	6					
6	6					
8	6					At meridian, Montock bears N.25°
10	6					W. distance 189 miles.
12	6					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		N.	W.	N.		W.	W.
NWbN½W	144	111	91	38° 13′		114	70° 14′

Yesterday's lat. 36° 22′N.
Diff. lat. to-day, 1 51 N.

Latitude come to, 38 13 N.

74 35

Middle latitude, 37 17

With middle lat. 37°, and dep. 91. the diff. long. is found 114m.

Yesterday's long. 68° 20′W.
Diff. long. to-day, 1 54 W.

Longitude in to-day, 70 14 W

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Friday, May 28.
2	5	5	N.½W.	W.N.W.	½	
4	5	5				These 24 hours, variable winds and fair weather.
6	5	5				
8	5	5				
10	5		N.E.	N.N.W.	½	
12	5					At 8 P.M. wind hauls to the northward.
2	5					
4	5					
6	5					
8	4	5	West.		½	At noon, Montock bears N,38°W. distance 99 miles.
10	4	5				
12	4	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		N.	E.	N.	N.	E.	W.
N.9°E.	74	73	12	39° 26′	39° 46′	15	69° 27′

Yesterday's lat. 38° 13′N.
Difference lat. 1 13 N.

Lat. by D.R. 39 26

Middle latitude, 38 49
Diff. long. 0° 15′E.
Yesterday's longitude, 70 14 W.

Longitude in, by D.R. 69 59 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S	E.	W.
North.	44	44.0			
N E.½E.	50	31.7		38.6	
WbS.½W	27		2.6		26.9
		75.7	2.6	38.6	26.9
		2.6		26	
		73.1		11.7	

The latitude by account differs 20 miles from the latitude by observation, I therefore correct the longitude by Case II. page 47.

By examining the two days' work since last observation, I find the lee-way hath been reasonably allowed, and by examining the log-line and glass, find them both right—but, by examining the ship's place on the Chart, I find we have sailed, since last observation, nearly 36 hours in the Gulf stream, setting about N.E ½E. at least 1 mile per hour, which is probably the cause of the error in latitude.

Current's drift N.E½E. say 32 miles, makes difference of latitude 20.1N. and extra departure 24.9E.

Latitude in, by D.R.	39°	26′N.
Diff. lat. by current,		20N.
Lat. in, corrected,	39	46 N.

Agreeing with the latitude by observation.

Now, the mid. lat. 40, as above, and dep 24.9, give diff.long. 32 miles East.

Longitude in, by D. R.	69°	59′W.
Diff. long. by current,		32 E.
Cor. or true long. in,	69	27 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Saturday, May 29.
2	7		N.W.¾W.	S.E.		
4	7					These 24 hours, fresh breezes from the eastern board.
6	7					
8	7					
10	7					
12	7					At 6 A.M. made Montock bearing W.byN.¼W. distant 7 leagues.
2	7					
4	7					
6	7					At 9 o'clock, A.M. came up with Montock; the wind being fair, stood directly in for New-London harbour.
8						
10						
12						

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		N.	W.	N.		W.	W.
N.W.bW.	141	78	122	40° 59′		159	71° 54′

The course and distance run by the log-book, and the bearing and distance of the land, being put into a Traverse Table, will give the result of the day's work as above, agreeing, nearly, with the latitude and longitude of Montock point and Lighthouse.

VARIATION OF THE COMPASS.

THE variation of the Compass, is the number of degrees and minutes on which the north point of your compass stands, inclined either to the eastward, or westward of the true north;* and is readily found by the sun's true amplitude.

2. The sun's *true amplitude* is the number of degrees and minutes, between the centre of the sun, at his rising or setting, and the true east or west point of the horizon.

3. The sun's *magnetic amplitude* is the number of degrees, &c. the centre of the sun, at his rising or setting, is to the northward or southward of the east, or west point of the compass.

---

* Whatever number of degrees the north point of your compass varies from the true north, the same will all the other points deviate from the true corresponding points of the horizon.

To find the Sun's true amplitude.

Look for the given declination, at the top of the Table of Amplitudes; and for the latitude, in the side column on the right or left; and in the common angle of meeting will stand the true amplitude.

EXAMPLES.

I. In latitude 50°N. when the declination was 22°N. required the sun's true amplitude, at rising?

Under the declination 22°, and against the latitude 50°, stands 35° 39′, the true amplitude; that is E. 35° 39′ northerly; it being always of the same name with the declination, whether north or south.

II. Required the sun's true amplitude, at rising, on the 15th of May, 1815, in latitude 50° 12′N.

The sun's declination, May 15, 1815, is 18° 44′N. Now, against latitude 50°, and under the declination, which is nearest to 19°, stands 30°, 26′ the true amplitude; that is E. 30° 26′ northerly, because the declination is north.

III. Required the sun's true amplitude, at setting, on the 20th of December, 1816, at Montock point, in latitude 41° 04′N.?

Ans. W.31° 51′ Southerly.

IV. Required the sun's true amplitude, at setting, on the 10th of June, 1814, in latitude 54° 49′N.?

Ans. W.42° 56′ Northerly.

V. Required the sun's true amplitude, at setting, on the 23d of September, 1817, in latitude 43° 30′N. near Ferrol, Spain?

Ans. 0° 00′. The sun sets due West.

To find the variation of the Compass.

1. Observe the sun's amplitude by your compass, when in the horizon, which call magnetic amplitude, or amplitude per compass.

2. Find the sun's true amplitude, by the Table, as in the foregoing examples, Then, if these two amplitudes agree, there is no variation; but if they do not agree, their difference is the variation, if they be both north, or both south; but if they be of different names, that is, one north and the other south, their sum is the variation; and, to know whether the variation be easterly or westerly, observe this general

RULE.

Let the observer's face be turned to the sun; then if the true amplitude be to the right hand of the magnetic, the variation is easterly; but, if to the left hand, the variation is westerly.

EXAMPLE.

I. Suppose the sun's magnetic amplitude, at rising, be E.25° 10′N. but the true amplitude is found to be E.12° 19′N. Required the variation?

Magnetic, or amplitude per compass, E.25° 10′N.
True amplitude by the Table, E 12 19 N.

Variation, 12′ 51 E.

The variation is easterly, because the true amplitude lies on the right hand of the magnetic, or observed amplitude.

II. Suppose the sun's true amplitude, at setting, be W.44° 24′S. and his magnetic amplitude W.23° 13′S. Required the variation?

True amplitude,	W.44° 24′S.
Magnetic amplitude,	W.23° 13 S.
Variation,	21 11 W.

The variation is westerly; because the true amplitude lies on the left hand of the magnetic.

III. Being at sea, on the 15th of July, 1814, in latitude 50° 49′N. the sun sets by my compass, W.25° 15′ Northerly. Required the variation?

July 15th, 1814, the sun's declination is found to be 21° 37′N. latitude nearest 51°, and declination nearest 22°, give the true amplitude W.36° 32′ Northerly.

Magnetic amplitude,	W.25° 15′N.
True amplitude,	W.36 32 N.
Variation of my compass,	11 17 E.

The variation is Easterly; because the true amplitude lies on the right hand of the magnetic.

IV. At sea, on the 28th of February, 1815, in latitude 42° 19′N. the sun sets, by the compass, W.4° 15′ Northerly. Required the variation?

Ans. 15° 01′ Westerly.

V. At sea, on the 23d of September, 1817. in latitude 43° 30′N. the sun sets, by my compass, W.22° 30′Northerly. Required the variation?

Ans. 22° 30′ Westerly.

VI. Being at sea, on the 3d of July, 1814, in latitude 49°N. the sun rises, by my compass, E.36° 33′Northerly. Required the variation?

Ans. The variation is 0° 00′

The use of the Variation is to correct the courses steered by the compass.

1 If the variation, found by the foregoing Rule, be westerly, it shows how many degrees the north point of your compass settles, or stands inclined to the westward, or left hand of the true north; but easterly variation shows how far the north point of your compass stands inclined to the eastward, or right hand of the true north.

2. The variation, if any, must be allowed upon all courses steered, and upon all bearings that are taken by the compass; that is, if it be easterly variation, it must be allowed to the right hand; but if westerly, to the left hand of the course, or bearing; supposing yourself placed in the centre of the compass, and looking directly forward to the point you are to allow the variation upon.

EXAMPLES.

I. Suppose I steer S.W. and there be one point westerly variation, then my true course is S.W. by S. Or suppose I set a point of land, and find it to bear by the compass E.S.E. and I know there is half a point easterly variation, then the true course is S.E.by E.½E.

When lee-way and variation, both are allowed one way, that is, both to the right hand, or both to the left, add them together, and allow their sum the same way they were to be allowed; but, if they be allowed one to the right hand and the other to the left, subtract the less from the greater, and allow the remainder the same way the greater was to be allowed.

II. Suppose I steer N.N.W. with my starboard tacks on board, and make one point lee-way, there being, at the time, half a point westerly variation; required my true course?

	p.	*qr.*
Starboard tacks on board, lee-way to the left hand,	1	0
Variation westerly, to be allowed to the left hand,	0	2
Their sum to be allowed to the left hand,	1	2

Hence the true course is N.W. by N.½W.

III. Suppose I steer S.W. by W. with my larboard tacks on board, and make two points and a half lee-way, and I have one point and a quarter, westerly variation; what is my true course?

Lee-way to the right hand,	2½ points.
Variation to the left hand,	1¼ points.
The remainder to be allowed to the right hand,	1¼

Whence the true course is W S.W.¼W.

Application and use of the variation, in correcting the courses steered by the compass; in a Journal from London to Madeira, in which are exemplified the manner of allowing for the variation, lee-way, lying-to, calms, currents, heave of the sea; also, of applying the new and concise method of correcting the Dead Reckoning by an observation; with many occurrences that commonly happen at sea.

JOURNAL

OF

A VOYAGE FROM LONDON TO MADEIRA,

IN THE SHIP PINCKNEY, OF BALTIMORE,

James Manley, Commander.

Kept by William Hardy, Chief Mate.

Departure taken from the Lizard, in latitude 49° 57′N. long. 5° 14′W. bound to Funchal, in Madeira, in lat. 32° 38′N. long. 17° 05′W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Sunday, April 10, 1814.
2						These 24 hours, moderate breezes.
4						
6						At 6 P.M. the Lizard bore N.byE. ¾E. distance 6 leagues, from which I take my departure; it being in lat. 49° 57′N. and long. 5° 14′W.
8	4		SWbW.¾W.	N.E.		
10	4	5				
12	5					
2	5					
4	5	5	S.W.¾W.			At 10 A.M. Ushant bore N.80°W. distance 52 miles.
6	5	5				
8	5	5				
10	5	5				Variation 2¼ points westerly.
12	6					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.		W.	W.
S.27°W.	108	96	48	48° 21′		1° 14′	6° 28′

The Lizard bearing N. by E.¾E. distance 6 leagues from the ship, is the same as if the ship had sailed from the Lizard, 18 miles upon the opposite, or S. by W. ¾ W. point of the compass, and allowing for the variation, makes it S.½E. distance 18 miles, which is to be set down as the first course and distance, in the following Traverse.

Lat. from 49° 57′N. M.P. 3470
Diff. lat. 1 36 S.

Lat. in, 48 21 N. M.P. 3323

Mid. lat. 49 09 M.D.L. 147

TRAVERSE TABLE.

Courses.	Dist.	N.	S	E.	W.
S.$\frac{1}{2}$E.	18		17.9	1.8	
SWbS$\frac{1}{2}$W	37		28.6		23.5
SSW$\frac{1}{2}$W.	56		49.4		26.4
			95.9		49.9
					1.8
					48.1

With the middle latitude 49°, and departure 48.1. the difference of longitude is found 74 miles. Or,

With the course 27°, and mer. diff. lat. 147, the diff. long. is found to be nearly 75 by Mercator's Sailing.

Lizard's longitude, 5° 14′W.
Diff. longitude 74 miles, = 1 14 W.

Long. in. or ship's long. 6 28 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Monday, April 11, 1814.
2	6		SWbW$\frac{3}{4}$W	N.		
4	5	5				These 24 hours, moderate breezes.
6	5					
8	5					
10	3	6	S.W.$\frac{3}{4}$W.	N.W.		At 6 P.M. got the bower anchor on the gunnel, unbent the cables, and stowed them.
12	3	4				
2	3	4				
4	4	5				
6	4	6				At noon, Cape Ortegal bore S.2$\frac{1}{2}$°E distance 183 miles.
8	5		SW.bS$\frac{3}{4}$W.	W.N.W.		Variation 2$\frac{1}{4}$ points westerly.
10	4	5				
12	4					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.		W	W.
S.30°W.	108	93	53	46° 48′		1° 19′	7° 47′

The variation being allowed upon each course, and the distance summed up, as before taught, the Traverse Table will stand thus:

Yest. lat. 48° 21′N. M.P. 3323
Diff. lat. 1 33 S.

Lat. in, 46 48 N. M.P. 3185

Mid. lat. 47 34 M.D.L. 138

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
SWbS$\frac{1}{2}$W	43		32.2		27.3
SSW$\frac{1}{2}$W.	39		34.4		18.4
SbW$\frac{1}{2}$W.	27		25.8		7.8
			93.4		53.5

With the mid. lat. 47° 34′, and dep. 53, the diff. long. is found 79 miles.

With the course 30°, and mer. diff. of lat. 138, the diff. long. is found 79 miles.

Yesterday's longitude, 6° 28′W.
Diff. of longitude, 79, = 1 19 W.

Longitude in, 7 47 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Tuesday, April 12, 1814.
2	4		S.W.	W.N.W.	0	These 24 hours, moderate gales and
4	4					clear weather
6	4					90
8	4	5	S.W.byS.	W.byN.	½	Obs. sun's mer. alt. at noon, 61 40
10	4	5				
12	4	5				Zenith distance, 28 20 N.
2	4	5				Declination, 17 03 N.
4	4		S.S.W.	West.	1	
6	4					Lat in, by observation, 45 23
8	4					At noon, Funchal bears S.29°W.
10	4					distance 876 miles.
12	4					Variation 1½ point westerly.

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.	N.		W.
S.3½°W.	97	96	14	45° 12′	45° 23′	0° 21′	8° 01′

By allowing the variation and lee-way, the work will be as follows.

Yesterday's lat. 46° 48′N.
Difference lat. 1 36 S.

Lat in, by D.R. 45 12 N.

Middle latitude, 46 00
Difference long. 0° 21′W.
Yesterday's long. 7 47 W.

Longitude in, by D.R. 8° 08′W.

Traverse Table.

Courses.	Dist.	N.	S.	E.	W.
SSW.½W.	24		21.2		11.3
S.by W.	36		35.3		7.0
S.½E.	40		39.8	3.9	
			96.3	3.9	18.3
					3.9
					14.4

The latitude by observation differs from the latitude by account, the reckoning being 11 miles ahead of the ship; and by examining each day's work, by D.R. I find the variation, lee-way, &c. have been sufficiently allowed, and the log-line and half-minute glass both right; we find no current, worth noticing, on the first, nor second day after leaving the land,—but, by examination, find we have sailed these last 24 hours, in a moderate current, setting by compass, N.E. by N.¾E. about half a mile per hour, which is probably the cause of the error in lat.

Therefore, the longitude by D.R. may be corrected by Case II. page 47. Current's motion, corrected for variation N.N.E.¼E. distance 12 miles. Diff. lat. 11°N. Dep. 5 E. Mid. lat. as above, 46, and departure 5, give difference longitude 7 miles E.

Latitude in, by D.R. 45° 12′N.
Diff. lat. by current, 11 N.

True latitude in, 45 23 N.

Longitude in, by D.R. 8° 08′W.
Diff. long. by current, 7 E.

True longitude in, 8 01 W.

H	K	F	Courses.	Winds.	Lee Way	Remarks on board, Wednesday, April 13, 1814
2	3	5	SbW.¾W.	West.	1	These 24 hours, moderate gales and fair weather. At 3 P.M. set up mizen top-mast shrouds and back stays. At 5 A.M. saw a fleet of ten sail, to lee-ward, apparently men of war At noon, Funchal bore S.32½°W. distance 815 miles. Variation per amplitude, 1¼ points westerly.
4	3	5				
6	3	5				
8	3					
10	3	5				
12	3					
2	3					
4	3		S.byW.	W.byS.	1	
6	3					
8	3					
10	3					
12	3					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.9°E.	76	75	12	44° 08′	44° 08′	17	7° 44′

Yest. lat. 45° 23′N. M.P. 3063
Diff. lat. 1 15 S.

Lat. in, 44 08 N. M.P. 2957

Mid. lat, 44 45 M.D.L. 106

With the middle latitude 45°, and departure 11.8, the diff. of long. is found 17 miles. Or,

With the course 9°, and mer. diff. lat. 106, it is found the same by Mercator's Sailing.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.½E.	46		45.8	4.5	
S.by E¼E.	30		29.1	7.3	
			74.9	11 8	

Yesterday's longitude, 8° 01′W.
Difference of longitude, 17 E.

Longitude in, 7 44 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Thursday, April 14, 1814.
2	3	5	West.	S.S.W.	3	These 24 hours, hard gales and squally. Handed the fore and main courses. At 9 P.M. saw a ship to windward, with a signal of distress, dismasted. Could not speak her. Set the courses close reefed. Set the top-sails close reefed. At noon, Funchal bears S.31°W. distance 800 miles. Variation 1¼ points westerly.
4	3	5				
6	3	5				
8			Lay to, up N.			
10			W.bN. off N.by	West.	5	
12			E.drift 1½m.p.h.			
2			up N.W. off N.	W.byS.		
4			drift 1½ miles			
6			per hour.			
8	5		S.W.	NWbW½W.	½	
10	5					
12	5					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.		W.	W.
S.81°W.	25	4	25	44° 04′		36	8° 19′

Taking the middle points, viz. N. by W. and N.N.W. between the points to which the ship comes up, and the point she falls off to, for the second and third courses, and then allowing as before for variation and lee-way, the Traverse Table will stand as follows :

Yest. lat. 44° 08′N. M.P. 2957
Diff. lat. 4 S.

Lat. in, 44 04 N. M.P. 2951

Mid. lat. 44 06 M.D.L. 6

With the mid. lat. and dep. the diff. long. is found 35. Or,

With the course, and mer. diff. lat. the diff. of long. is found by Mercator to be 38
Yesterday's long. 7° 44′W.
Diff. longitude, 35 W.

Longitude in, 8 19 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
WNW¼W.	21	7.1			19.8
N.N.E.¾E.	9	7.7		4.6	
N.byE.¾E.	9	8.5		3.0	
SS.W.¼W.	30		27.1		12.8
		23.3	27.1	7.6	32.6
			23.3		7.6
			3.8		25.0

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Friday, April 15, 1814.
2				Calm.		Rain and fog.
4						At 6 P.M. thunder; clears off at 10 P.M.
6						
8						
10	3	5	W.S.W.	South.	1	Fresh gales.
12	4	4				
2	4	6				Spoke a brig, 30 days from Cuba,
4	4	8				bound to Bilboa.
6	4	6				At noon, Funchal bears S.27°W.
8	4	8				distance 750 miles.
10	4	8				Variation 1¼ points westerly.
12	4	5				

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.	N.	W.	W.
S.65°W.	72	31	65	43° 33′	43° 34′	1° 31′	9° 50′

Yesterday's lat. 44° 04′N.
Diff. lat. to day, 31 S.

Lat. in, by D.R. 43° 33N.

Middle latitude, 43 48
Difference longitude, 1° 31′W.
Yesterday's longitude, 8 19 W.

Longitude in, 9 50 W.

Courses.	Dist.	N.	S.	E.	W.
SW.bW¾W.	72		30.8		65.1

The latitude by D.R. nearly agrees with the latitude by observation, therefore, the longitude in, by D.R. needs no correcting.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Saturday, April 16, 1814.
2	4	5	W.S.W.	South.		Moderate gales. Heavy thunder with rain. The lightning shivered our main top-gallant-mast, and, the shrouds being wet, it passed by the shrouds into the water, doing no other injury. A great swell from the S.W. for which I allow 6 miles. At noon, Funchal bears S.24°W. distance 676 miles. Variation 1 point westerly.
4	4	5				
6	4	5				
8	4					
10	4					
12	4					
2	3	5				
4	3	5	S.W.b.W.	S.byE.		
6	3	5				
8	3					
10	3					
12	3					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.	N.	W.	W.
S.53½°W.	84	50	67	42° 44′		1° 32′	11° 22′

Yest. lat. 43° 34′N. M.P. 2910
Diff. lat. 50 S.

Lat. in, 42 44 N. M.P. 2841

Mid. lat. 43 09 M.D.L. 69

With middle latitude 43°, and departure 67.5, the difference of longitude is found 1° 32′W.
Yesterday's long. 9 50 W.

Longitude in, 11 22W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
SW.byW.	58		32.2		48.2
S.W.	32		22.6		22.6
N.E.byN.	6	5.0		3.3	
		5.0	54.8	3.3	70.8
			5.0		3.3
			49.8		67.5

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Sunday, April 17, 1814.
2	4	5	W.byN.	S.W.byS.		Fresh gales and clear weather. Saw a large ship to leeward. At noon, Funchal bears S.13°W. distance 608 miles. Variation 1 point westerly.
4	4	5				
6	4	5				
8	5					
10	5					
12	5					
2	5	5	W.½N.	SSW½W.	½	
4	5	5				
6	5	5				
8	5	5				
10	5	5				
12	4					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat by Obs.	Diff. Long.	Long. in.
			W.	N.	N.	W.	W.
West.	120	0	120	42° 44′	42° 30′	2° 43′	14° 05′

The variation being allowed on both courses, and the lee-way upon the second, it will be found that the ship hath sailed due west these last 24 hours; and by summing up the distances, her whole distance is found to be 120 miles, which is also her departure. It is evident she has made no difference of latitude, therefore her latitude by account is the same as yesterday.

Lat. by obs. 42° 30′. With the lat. in, 42° 30′ and dep. 120, the
Diff. of long. is found 2° 43′W.
Yesterday's long. 11 22 W.

Longitude in, 14 05 W.

The latitude by observation, not agreeing with the latitude by account; but since no further allowance can reasonably be made for currents, lee-way, or heave of the sea, the error, most probably is in the course and distance. The ship having outrun her reckoning, shows a probability that she hath made good a less course, and a little greater distance than is given by the log; which does not alter the departure by account. Consequently the longitude by account, without being altered, is more likely to be the true longitude, than if it were altered by any further attempt to correct it, (by Case II.)

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Monday, April 18, 1814.
2	8		S.S.W.	N.W.byW.		Fresh gales, thunder and rain.
4	8					
6	8	5				From 2 P.M. fair weather and moderate.
8	8	5				
10	8	5				Set top-gallant sails.
12	8	5				
2	9	0				Variation 1 point westerly, per amplitude.
4	6	0	S.$\frac{3}{4}$E.	SWbW$\frac{1}{4}$W	$\frac{1}{2}$	
6	5	5				
8	5	5				At noon, Funchal bears S.19°W. distance 446 miles.
10	5					
12	5					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.		N.	N.		W.
South.	170	170	0	39° 46′	39° 40′	0	14° 05′

TRAVERSE TABLE.

Yesterday's latitude, 42° 30′N.
Diff. of lat. by account, 2 44 S.

Lat. in, by account, 39 46 N.

Courses.	Dist.	N.	S.	E.	W.
S.byW.	118		115.7		23.0
S.S.E.$\frac{1}{4}$E.	54		48.8	23.1	
			164.5	23.1 23.0	23.0
				0.1	

Proper allowance being made for variation and lee-way, it appears, from the Traverse Table, that the course made good is due South, 164½ miles, and as she made no departure, her longitude in, is the same as yesterday; but by observation, the ship is found to be 6 miles ahead of her reckoning; hence it is evident that the true difference of latitude is likewise the true distance.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Tuesday, April 19, 1814.
2	8		SSW.¾W.	WbN¼W.		
4	8					Stiff gales and clear weather.
6	8	5				
8	8	5				
10	8					At 6 P.M. spoke brig Curran,
12	8	5				from Dublin, bound to Leghorn.
2	8	4				
4	8	4				At noon, Funchal bears S.20°W.
6	8	6				distance 253 miles.
8	8	6				Variation ¾ points westerly
10	8	5				
12	8					

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	W.	N.	N.	W.	W.
S.18°W.	193	184	58	36° 29′	36° 36′	1° 14′	15° 19′

Latitude left, 39° 40′N.
Diff. latitude, 3 11 S.

Lat. in, by ac't 36 29 N.

Courses.	Dist.	N.	S.	E.	W.
S.b W.½W.	200		191.4		58.0

In this day's work, the variation and lee-way have both been carefully allowed, the log-line and glass are both right, and there is no discoverable current; still the latitude by observation differs from the latitude by D.R. 7 miles. I therefore correct by Case I. for a single day, page 46.

Yesterday's latitude,	39°	40′N.
This day's ob's lat.	36	36 N.
True diff. latitude,	3	04=184m.
Sum of latitudes,	76	16
Middle latitude,	38	08

With the true difference of latitude between the two observations, 184, and departure 58 m. the true course is found S.18°W. distance 193 miles.

With middle lat. 38°, and dep. 58, the diff. long. is, 1° 14′W.
Yesterday's longitude, 14 05 W.

Longitude in, this day, 15 19 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Wednesday, April 20, 1814.
2	4	3	WbS.½W	SbW½W.	½	
4	4	5				These 24 hours, first part, moderate breezes, with rain; latter part, clear.
6	4	7				
8	5		WSW½W	S.½W.	½	
10	5	2				
12	5	3				
2	5	5	W.S.W.	South.	½	
4	5	5				
6	5	4				At noon, Funchal bears S.10°E. distance 191 miles.
8	5	1				
10	5		SWbyW.	S.byE.	½	
12	4	5				Variation ¾ points westerly.

Courses	Dist.	Diff. Lat.	Dep.	Lat by D.R.	Lat. by Obs	Diff. Long.	Long. in
		S.	W.	N.	N.	W.	W.
S.67°W	128	50	118	35° 52′	35° 46′	2° 26′	17° 45′

Yesterday's latitude, 36° 36′N.
Difference of latitude, 0 44 S.

Latitude in, by D.R, 35 52 N.

In this day's work, the latitude by observation differs from the latitude by account, 6 miles, the ship having out run the reckoning And since the lee-way is reasonably allowed, and there is no current; I next examine the log-line, and find it truly divided, to correspond with a glass that runs 30 seconds; but, by trying the glass. find it runs only 28 seconds, therefore I correct this error, by the proportional numbers in the Table, page 34.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
W.byS.¼W.	27		4.0		26.7
WSW.¼W.	31		10.4		29.2
SWbW¾W	43		18.4		38.9
S.W.¾W.	19		11 3		15.3
			44.1		110.1

Diff. lat. by D.R 44 and dep. 110
Proportional no. 107 107

Products, 47,08 117,70

Diff. latitude, 47, and dep. 118, corrected for the error of the glass, &c.

Yest. lat. 36° 36′N. M.P. 2363
Obs. lat. 35 46 N. M.P. 2301

Diff. lat by obs. 50 M.D.L. 62

Sum of lat. 72 22

Mid. lat. 36 11

With the true diff. lat between the two observations 50, and corrected dep. 118, the true course is found S.67°W and the distance 128 miles

With mid. lat. 36, and corrected dep. 118, the diff. long. is found 146. Or,

With the true course 67°, and mer. diff. lat. 62, the diff. long. is found 146, by Mercator's sailing.

Yesterday's long. 15° 19′W.
Diff. longitude, 2 26 W.

Longitude in, 17 45 W.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Thursday, April 21, 1814
2	6	6	S.bE.½E.	S.W.½W.	½	These 24 hours, moderate breezes, and hazy weather.
4	5	8				
6	5	8				
8	5	8				
10	5		S.S.E.	S.W.	½	
12	5	2				
2	5	3				We suspect a current.
4	5	5	S.S.E.½E.	SWbS½W	½	
6	5	5				At noon, Funchal bears S.28°W. distance 88 miles.
8	5	5				
10	5	6	S.E.byS.	S.W.byS.	½	
12	5	4				Variation ¾ points westerly.

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in.
		S.	E.	N.	N.	E.	W.
S.34°E.	133	110	75	34° 01′	33° 56′	91	16° 14′

Yest. lat. 35° 46′N.
Diff. lat. 1 45 S.

Lat. by ac. 34 01 N.

Obs. lat. 33 56 N. M.P. 2167
Yest. lat. 35 46 N. M.P. 2301

Proper diff. lat. by obs. 1 50 M.D.L. 134

Sum of lat. 69 42

Mid. lat. 34 51
Yesterday's lat. 35° 46′N.
Correct diff. lat. 1 50 S.

Latitude in, 33 56 N.
Agreeing with lat. by obs.

With the true course 34°, and mer diff. lat. 134, the diff. long. is found by Mercator's Sailing, 91 miles.

Yesterday's long. 17° 45′ W.
Diff. longitude, 1 31 E.

Longitude in, 16 14 W.

TRAVERSE TABLE.

Courses.	Dist.	N.	S.	E.	W.
S.S.E.¾E	48		41.2	24.7	
SEbS.¼E.	31		24.9	18.5	
SEbS.¾E.	33		24.4	22.2	
S.E.¼E.	22		14.8	16.3	
			105.3	81.7	

The latitude by observation differs from the lat. by D.R. 5 miles; and, on examination, I find there is a moderate current setting, by the compass, S.W. by W.½W. at the rate of about 9 miles, in 24 hours. This being for a single day, I correct by Case I. page 46.

Difference Lat. by D. R. 105 S. Dep. 82 E.
Cur. mo. SW3-4W. 9m. diff. lat 5 S. Dep 7 W.
Correct difference lat. 110 S. true dep 75 E.

With the true diff. lat between the two observations, 1° 50′=110m. and correct departure 75, the course is found S. 34°E. distance 133 miles.

With mid. lat. 35°, and true dep. 75°, the diff. long. is found, by middle latitude sailing, 91 miles.

H	K	F	Courses.	Winds.	Lee-way.	Remarks on board, Friday, April 22, 1814.
2	3	5	SWbS¼W	E.byN.		These 24 hours, first part, moderate breezes. The latter part, fresh gales from the N.E.
4	3	5				
6	3	5				
8	3	5				
10	3	5				
12	3	5				At 6 A M. saw Madeira bearing by compass, S.W by S. ½W or corrected, S.S.W ¾W. distant about 9 leagues, or rather 26 miles.
2	3	5				
4	3	5				
6	3	5		N.E.		
8						At 11 A M. came to anchor off Funchal.
10						
12						Variation ¾ points westerly.

Course.	Dist.	Diff. Lat.	Dep.	Lat. by D.R.	Lat. by Obs.	Diff. Long.	Long. in
		S.	E.	N.		W.	W.
S.59°E.	88	78	43	32° 38′		51	17° 05′

The course and distance by log, and bearing and distance of the land, will give the result as above.

TIDES.

TO FIND THE CORRECT TIME OF HIGH WATER, BY THE NAUTICAL ALMANACK.

RULE.

FIND by the Nautical Almanack page VI. the time of the moon's passing the meridian of Greenwich, on the given day, and find the longitude of the given place in the left hand side column of Table D and adjoining will stand a number of minutes, which add to the time of passing the meridian of Greenwich in west longitude, but subtract it in east longitude, and you will have the time of the moon's passing the meridian of the given place, nearly. With this time enter Table E and take out the adjoining correction; which add or subtract from the above time of passing your meridian according as the tables direct—and to this sum or difference, add the time of full sea on the full and change days, and you will have the time of high water past noon of the given day. But if the sum exceeds 12h. 24m. or 24h. 48m. subtract those times from it, and the remainder will be the time of high water in the afternoon of the given day, nearly.

EXAMPLE I.

Required the time of high water at New London, longitude 72° W. July 6, 1818.

	h.	m.
Moon passes the meridian of Greenwich, by N Almanack	2	26
Correc. for long 72° W. from Table D.		9
Moon passes meridian of N. London	2	35
Correction for that time from table E.		42
High water at New-London full and change days	1	53
	8	56
High water afternoon	10	49

II. Required the time of high water at Charleston, (S. C.) say longitude 80° W. April 18th 1818.

Table D.

Long of the place.	Cor. of m'ns pass. merid
Deg	min.
0	0
10	1
20	3
30	4
40	5
50	7
60	8
70	9
80	11
90	12
100	14
110	15
120	16
130	18
140	19
150	20
160	22
170	23
180	24

Table E.

Mn's pass. over merid.		Corrections.			Mn's. pass. over merid.	
h.	m.		h.	m	h.	m.
0	0	Sub.	0	0	12	0
0	30		0	8	12	30
1	0		0	15	13	0
1	30		0	24	13	30
2	0		0	33	14	0
2	30		0	41	14	30
3	0		0	50	15	0
3	30		0	57	15	30
4	0		1	3	16	0
4	30		1	7	16	30
5	0		1	8	17	0
5	30		1	6	17	30
6	0		1	0	18	0
6	30		0	50	18	30
7	0		0	30	19	0
7	30		0	24	19	30
8	0	Add.	0	3	20	0
8	30		0	14	20	30
9	0		0	22	21	0
9	30		0	24	21	30
10	0		0	23	22	0
10	30		0	21	22	30
11	0		0	15	23	0
11	30		0	9	23	30
12	0		0	0	24	0

	h.	m.
Moon passes the meridian of Greenwich, at	10	21
Correction for longitude 80°	+	11
Moon passes the meridian of Charleston	10	32
Correction for that time from table E		21
	10	53
High water at Charleston, on full and change days	7	13
	18	06
	12	24
High water afternoon	5	42

III. Required the time of high water at Marblehead, longitude 70° 50′ W. September 20th 1818.

	h.	m.
Moon passes the meridian of Greenwich	16	56
Correction for longitude 70° 50′ W.		9
Moon passes the meridian of Marblehead	17	05
Correction for that time from Table E	1	8
	15	57
High water at Marblehead, on full and change days	11	32

27 29
24 48

High water at Marblehead, Sept. 20, 1818, afternoon 2 41

The above method is the most accurate, but if a Nautical Almánack be not at hand, you may find the time of high water by the following Table G. depending on the Golden Number. which is commonly practised by seamen, although not so accurate as by the N. Almanack.

A Table for readily finding the Moon's age on any given day, &c.

TABLE G.

Gol. Numb.	Jan	Feb N M	Mar N M	Apr. N M	May N M	Jun. N M	July N M	Aug N M	Sep N M	Oct. N M	Nov N M	Dec N M
1	29	28	29	28	27	26	25	24	22	22	20	20
2	18	17	19	17	17	16	15	13	12	11	10	9
3	8	6	7	5	5	3	3	2	1.30	29	28	27
4	26	25	27	25	25	23	22	20	19	18	17	17
5	15	14	16	15	14	13	12	10	8	8	6	6
6	4	3	5	3	3	1	1.30	29	27	27	25	25
7	23	22	22	21	20	19	18	17	16	15	14	13
8	12	10	12	10	10	8	8	6	5	4	3	3
9	1	—	1	29	29	27	27	25	24	23	22	21
10	20	18	20	19	18	17	16	15	13	13	11	11
11	9	8	8	7	6	5	4	4	2	1	29	29
12	27	26	27	26	25	24	23	22	20	20	18	18
1	17	15	17	15	15	13	13	11	10	9	8	7
14	6	4	6	5	4	3	2	1.30	29	28	27	26
15	25	23	24	22	22	20	20	19	17	17	15	15
16	13	12	13	12	11	10	9	8	6	6	4	4
17	3	1	3	1	1.30	29	28	27	25	25	23	23
18	22	20	22	20	20	19	18	16	15	14	13	12
19	14	9	10	8	8	6	6	5	3	2	1	1.30

TABLE H.

☽'s age days.	High water h. m.
0	0 0
1	0 37
2	1 12
3	1 48
4	2 24
5	3 3
6	3 46
7	4 36
8	5 41
9	6 59
10	8 16
11	9 19
12	10 9
13	10 54
14	11 25
15	12 10
16	12 45
17	13 20
18	13 56
19	14 33
20	15 13
21	15 57
22	16 51
23	17 58
24	19 19
25	20 34
26	21 35
27	22 24
28	23 6
29	23 44
29½	24 00

Use of the foregoing Tables.

Add 1 to the given year, and divide the sum by 19, the remainder will be the Golden Number, (but if 0 remain, the golden number will be 19,) which being marked with a pencil at the top of the Table, will show the golden number during that year.

To find the Moon's age on any given day, by Table G.

Look in the first column (marked Golden Number,) for the golden number, and under the month on the same line, stands the day of the new moon, then count the days which have compleatly passed since the last change, and they will be her age on the given day.

To find the time of High Water.

Look for the moon's age in Table H. and the hours and minutes opposite to which being added to the time of high water on the full and change days at any place, will, if it do not exceed 12 hours, give the time of high water at the given place in the afternoon of the given day; from which subtract 12h. 24m. or 24h. 48m. as before, if it exceed those times, the remainder will show the time of high water in the afternoon of the given day.

EXAMPLES.

1st. Required the time of high water at New Providence, Nov. 16th, 1817.

Opposite to 13 the Golden Number, and under November, I find it was new moon the 8th day, and reckoning forward to November 16th gives the moon's age 8 days, against which in Table H stands

	h.	m.
	5	41
High water at New-Providence on full and change days	8	00
	13	41
	12	24
High water New-Providence afternoon	1	17

2d. Required the time of high water at Gay Head, November 20th, 1817.

By Table G. it is new moon 8th day, which gives the moon's age 12 days, against which in Table H stands

	h.	m.
	10	9
High water at Gay Head on full and change days	7	39
	17	48
	12	24
High water at Gay Head in the afternoon	5	24

3d. Required the time of high water at London, November 18th, 1818.

Now in Table G against the Golden Number 14, under October, stands the day of New Moon the 28th, thence to November 18th makes 21 days the moon's age on the given day.

	h.	m.
Moon's age 21 days, gives in Table H	15	57
High water at London on full and change days	2	50
	18	47
	12	24
High water at London afternoon	6	23

When the moon is in her perigee, or nearest approach to the earth, the Tides rise higher than they do under the same circumstances at other times, and are lowest when she is in her apogee, or farthest distance from the earth.

The Spring tides are greatest about the time of the Equinoxes, in March and September, and neap tides are less.

A TIDE TABLE,

Showing the time of high water at the full and change of the moon, at the following places; principally in Europe.

	h.	m.		h.	m.
Archangel,	6	4	Dunkirk, (France)	11	40
Aberdeen, (Scot.)	12	46	Gravesend, (Eng.)	1	30
Amsterdam, (Hol.)	3	0	Hague, (Holland)	8	45
Antwerp (do.)	6	6	Havre de Grace, (France)	9	6
Bayonne, (France)	3	29	Lisbon, (Portugal)	2	15
Beachy Head, (Eng.)	10	15	Liverpool,(Eng.)entrance of harbour.	10	30
Belfast, (Ireland)	10	29			
Bordeaux, (France)	3	0	London, (Eng.)	3	0
Bristol, (Eng.)	6	45	Madeira Island	11	24
Cadiz, (Spain)	3	10	Naze, (Norway)	11	15
Cape Clear, (Ireland)	3	29	Rotterdam, (Holland)	3	30
Dort, (Hol.)	3	0	Ushant, (France)	4	30

A Table showing the time of high water at the full and change of the Moon, at the following places, on the Coasts of North America, placed Alphabetically.

	h.	m.		h.	m.
Amboy	8	15	Gay Head,	7	39
Annapolis (Md.)	10	50	Hackinsack,	12	0
Boston,	11	25	Halifax, (N.S.)	7	39
Burlington,	9	20	Hell-Gate, (N.Y.)	9	30
Block Island,	7	38	Hartford, (Conn.)	11	20
Canso,	11	50	Hingham,	7	30
Cape Ann,	11	25	Huntington, (L.I.)	11	0
Cape Fear,	8	00	Ipswich,	11	45
Casco Bay,	11	15	Jamestown, (Va.)	9	50
Charleston Bar,	7	13	Keys of Florida,	8	47
Cape Henlopen,	8	40	Louisburg,	12	0
Cock Spur, (Geo.)	9	0	Main Ocean,	9	45
Cape Cod,	11	29	Marblehead,	11	32
Capes Henry & Charles,	7	40	Mount Desert,	11	5
Fairfield, (Connect.)	11	0	Machias,	11	3
Frederica, (Geo.)	8	0	Moose Island,	11	30
Georgetown Bar,	6	57	Manomoy Point,	11	30
Guilford, (Connect.)	10	30	New-Bedford,	7	38
George's River,	10	40	Nantucket,	12	00
Goldsborough, (Mass.)	11	5	New-London,	8	56

	h.	m.		h.	m.
New-York,	8	56	Salem,	11	38
New-Haven,	10	20	Sandy Hook,	6	35
New-Providence,	8	0	Savannah,	7	40
Newtown Landing,	10	0	Saybrook, (Conn.)	11	15
Norwich Landing,	9	45	St. Augustine,	7	35
Penobscot,	10	40	St. John's, (Newf.)	12	0
Pensacola,	8	0	Sunbury, (Geo.)	9	33
Piscataqua, (N.H.)	11	40	St. Simon's Sound,	9	0
Plymouth, (Mass.)	11	35	St. Simon's Bar,	7	30
Polepel's Island,	12	0	St. Simon's Offing,	6	45
Port Royal, (S.C.)	8	30	St. Anastatia's Island,	7	30
Portsmouth, (N.H.)	11	45	Tybee Bar, (Geo.)	9	15
Providence, (R.I.)	8	10	Tarpaulin Cove,	9	50
Purisburgh, (S.C.)	7	0	Townsend,	10	40
Quebec,	8	5	White Stone, (N.Y.)	11	45
Reedy Island,	11	15	Williamsburgh, (Va.)	11	15
Rhode-Island,	6	48	Wilmington, (N.C.)	11	15

TO FIND THE TIME OF THE SUN'S RISING AND SETTING, AND THE LENGTH OF THE DAY AND NIGHT.

RULE.

FIRST find the Sun's Declination, with which enter Table XIII. at the top of the page, marked with the degrees of Declination, and the latitude in either side column, and in the angle of meeting is the Sun's setting, if the latitude and declination are of the same name, but the time of rising if of different names. The time of Rising subtracted from 12 hours will give the time of Setting, or the time of setting subtracted from 12 hours will give the time of rising, and if you double the time of the Sun's setting, you will have the length of the day, and double the time of the sun's rising will be the length of the night.

EXAMPLES.

1st. Required the time of the Sun's rising and setting, with the length of the day and night, on the 3d of December 1818, at Montock Point, lat. 41° 4′ N.

Under the declination, 22° December 3d, and against lat. 41° stands the time of the Sun's rising.

	h.	m.
The sun rises at	7	22
	12	00
Time of the sun's setting	4	38
		2
Length of the day	9	16
	24	00
Length of the night	14	44

2d. Required the time of the Sun's rising and setting at London, latitude 51° 32′ N. on the 20 June 1818.

Sun's declination 23° 28′ N. In Table XIII. Lat. 51° and Declination 23° N. gives the Sun's setting,

	h.	m.
	8	06
For Lat. 52	8	12
	2)16	18
Taking the Mean gives the true time of the sun's setting	8	9
		2
Length of the day	16	18
Sun sets	8	9
	12	0
Sun rises at	3	51

3d. Required the time of the Sun's rising and setting at Boston, latitude 42° 23′ N. on the 20th December, 1818.

Lat. 42° N. and declination 23° S. gives (in Table XIII.) the sun's rising.

	h.	m.
	7	30
	12	0
Time of setting	4	30
		2
Length of the day	9	00

TO FIND THE TIME WHEN ANY KNOWN STAR WILL BE ON THE MERIDIAN.

RULE.

FIND the Sun's Right Ascension on the given day, (by Table XI.) and likewise, the Star's Right Ascension, and subtract the Sun's Right Ascension from the Star's, the remainder will be the time of the Star's coming to the meridian (or southing.)

EXAMPLES.

1st. At what time will Aldebaran be on the meridian Jan. 20th 1818.

	h.	m.
Aldebaran's Right Ascension	4	25
Sun's Right Ascension, January 20th.	20	07
Aldebaran south in the evening	8	18

2d. Required the time when the Star Fomalhaut is south, on June 26th, 1817.

	h.	m.
Fomalhaut's Right Ascension	22	47
Sun's Right Ascension June 26th,	6	18
June 26th, the star south afternoon	16	29
Or, 27th day in the morning	4	29

STAR'S DECLINATION.

To find the Declination of a known Star.

RULE.

Find the Star's Declination (in Table XI.) and correct it for the annual variation, if necessary, and you will have its true declination.

EXAMPLE.

1. Required the declination of the Star Fomalhaut, January 1st. 1820.

Declination in 1810.	30	38 S.
Variation in 10 years.		3
Declination.	30	35 S.

2. Required the declination of the Star Antares, March 2, 1816.

Declination by Table in 1818	26°	0′	09 S
Variation in 2 years.			17
Star's Declination,	25°	59′	52 S.

TO FIND THE LATITUDE BY THE MERIDIAN ALTITUDE OF THE MOON.

YOU must find the time of the Moon's southing, or passing the meridian of the ship, in order to know when to observe her meridian altitude, and likewise her true declination must be found for the exact time of her southing; then you may obtain her central altitude, with which and her declination, you may find the latitude by the rules following.

To find the true time of the Moon's passing your Meridian.

Find the time of the Moon's coming to the meridian of Greenwich, on the given day, (Naut. Alm. page 6) and note the difference of her southing between this and the next following day, when you are in West Longitude, but the day before when in East Longitude. With this daily difference, enter the top column of Table XIV. and against the ship's Longitude in the side column, will stand the correction in minutes, to be added to the above time, of passing the meridian of

Greenwich, when you are in West Longitude, but subtracted in East Longitude ; thus you will have the true time of the Moon's passing the meridian of the ship.

EXAMPLE.

1. Required the time of the Moon's passing the meridian of New-London, August 9th, 1818.

By N. A. the moon passes over the meridian of Greenwich, August 9th, 5h. 46m. and August 10th, at 6h. 42m. the daily variation being 56m. under which variation in Table XIV. and against Longitude of New-London, 72° 16′ stands 11 minutes.

	h.	m.
Moon passes the Meridian at Greenwich at	5	46
Longitude 70 W. add the correction	+	11
Moon passes the meridian of New-London	5	57

2. Required the time of the moon's passing the meridian October 25, 1818, in longitude 90° E.

	h.	m.
The moon passes the meridian of Greenwich, by N. A. at	22	21
Daily difference 51m. and Long. 90° E. subtract	—	12
The moon passes the meridian Long. 90° E. October 25, at	22	9

afternoon, or October 26, at 10 o'clock, 9m. in the morning.

To find the Moon's declination when on the Meridian.

Turn the ship's longitude into time by Table XVII. to which add the time of the moon's coming to the meridian, if in West Longitude, but subtract it if in East, and you will have the time at Greenwich, or Reduced time.

In page 6th, of the Nautical Almanac, take out the moon's declination for the nearest noon and midnight, and find their difference, which will show the variation, or difference of the moon's declination in 12 hours.

Then enter Table XVI. with this difference in the left hand side column, opposite to which, and under the hours of Reduced time at top, you will find the correction for the hours. Then opposite to this, in the same line, and under the minutes at top, you will find the correction answering the minutes of Reduced time ; which add to the first correction, taken out for the hours, the sum will be the true correction, to be applied to the declination which stands first in the Nautical Almanac, Additive, if the declination be increasing, Subtractive if it be decreasing : which will give the true declination at the time of passing the meridian.

NOTE.—When the proportional part, or correction of declination, is Subtractive and greater than the declination itself, subtract the declination from the correction, the difference will be the true declination ; but it will be of a contrary name from the declination which stands first in the Nautical Almanac, or the same name as marked on the next day following.

EXAMPLE.

Required the Moon's declination, at the time of her passing the meridian, June 10th, 1818 in longitude 72 W.

	h.	m.
M'n. pass. the meri. of Gr'w.	5	19
Tab.XIV.d'ly.diff.45'lon.72W.		9
Moon passes merid. at ship	5	28
Long. 72 W. in time	4	48
Time at Greenwich	10	16
Mn's.decli.at noon in N.A.	15°.	20'N
Correc. by Table XVI.	2	13
True declina. required.	13	07N

June 10th declina. at noon	15°	20'
at midnight	12	44
Variation in 12 hours	2	36

In Table 16 with 2° 36' inside column, and under 10h. at top is the correction for the hours 2° 10' and under nearest to 16 min. is 3m. the correction for the minutes, the sum of which makes 2° 13' true correction.

* * *

Having the Moon's Meridian Altitude, and her declination at the time of observation, thence to find the Latitude.

RULE.

To the observed altitude of the moon's lower limb add 12 minutes, but if her upper limb was observed, subtract 20 minutes, which will give her apparent altitude nearly. This altitude must be corrected, for parallax and refraction, in order to obtain her true altitude, as follows.

In page VII. of the month, in the Nautical Almanac, find the day of the month answering the reduced time (above found) opposite to which, under midnight, take out the moon's Horizontal Parallax and set it down.

Then enter Table XV. with the moon's altitude in the side column, and the nearest minute of the moon's Horizontal Parallax (above found) at the top and in the angle of meeting will stand the correction, which added to the moon's apparent altitude will give her true central altitude, with which and her true declination find the latitude, the same as by a meridian altitude of the sun.

EXAMPLE I.

Being at sea, on the 15th of April 1818 in Long. 80° W. I took altitude of the moon's lower limb, when on the meridian 64° 40' bearing North of me, required the Latitude ?

	h.	m.
By N. A. the moon passes the merid. of Greenw. Ap'l. 15th at	7	56
The daily diff. being 49m. thence by Tab. XIV. correction	+	11
The time of the moon's passing the meridian at the ship	8	7
Longitude 80 W. in time,	5	20
Time at Greenwich past noon, or reduced time	13	27

Moon's declination April 15th at midnight,	19°	34′N.
Ditto. ditto. April 16th at noon,	17	14 N.
Difference in 12 hours,	2	20

In Table XVI. against 2° 20′ and under 13 hours, or 1 hour past midnight, stands 12′ correction for the hours. And under 27 min. stands 5, the correction for the minutes 12+5=17′ correction.

Moon's declination at midnight,	19°	34′ N.
Correction for 1h. 27m. past midnight,		17 N.
True declination,	19	17 N.

By N. A. moon's horizontal parallax, April 15th, at midnight, 60′ 31″.

Observed altitude of moon's lower limb,	64°	40′
		12
Moon's App. Alt.	64	52
In Table XV. mn's alti. 65° and hor. parall. 61′ gives cor.	+	25
Moon's true altitude	65	17
	90	00
Zenith distance,	24	43 S.
Moon's true declination,	19	17 N.
Latitude in	5	26 S.

2. At sea on the 25th of March, 1818, in Longitude 90° E. the altitude of the moon's upper limb as observed 50° 30′ bearing south, required the latitude.

	h.	m.
Moon passes the meridian of Greenwich, March 25th. at	15	01
Long. 90° E, and daily difference 55 in Tab. XIV, gives cor.		14
Time moon's passage meridian at ship,	14	47
Longitude 90° E. in time	6	00
Time at Greenwich, or reduced time	8	47
Moon's declination by N. A. March 25th, at noon,	16	14S.
at midnight,	18	56S.
Difference in 12 hours,	2	42
In Table XVI. the diff. 2° 42′ and 8h. 47m. gives correc.	1	58
Moon's declination standing first in the N. A. at noon	+ 16	14
Moon's true declination at passing meridian	18	12

By N. A. Moon's horizontal parallax at midnight 59′ 56″ or 60′.

Observed altitude of the moon's upper limb,	50°	30′
	—	20
Moon's apparent Alt.	50	10
In Tab. XV. the mn's alt. 50° and hor. par. 60 gives cor.		38
True altitude.	50	48
	90	00
Zenith distance,	39	12 N.
Moon's true declination,	18	12 S.
Latitude in	21	00 N.

3d. At sea on the 11th of September 1818, in Long. 45° W. the meridian altitude of the Moon's lower limb was 47° 25′ bearing south.—Required the Latitude.

Answer, 20° 26′ N.

REMARKS CALCULATED TO ASSIST COMMANDERS WHEN GOING INTO THE BRITISH CHANNEL.

AS mariners know that their reckonings are always uncertain, in proportion to the length of their several passages from the times of their last departure, it is natural to suppose that they must, when approaching to any difficult and dangerous navigation, experience great anxiety of mind for the issue. As the British Channel has proved fatal to many, it may be fairly ranked among those places which are deemed dangerous to ships, in their approach after long passages ; and, therefore, all those who are intrusted with the conducting of ships through it, ought to acquire such knowledge as may enable them to perform the duties of their important office. Channel-coasters, by the frequency of their passing and repassing through it, acquire such knowledge as those who are employed in foreign voyages cannot pretend to : hence it becomes necessary to furnish the latter with some useful information ; more especially, as it is next to impossible for the human mind, when engaged in various pursuits, to remember every necessary article, such as the course and distance from one place to another ; the precise situation of rocks and shoals ; and the direction and strength of the tide in the various places. Commanders of ships when coming from abroad, and about to enter the British Channel, must be exceedingly anxious to accomplish the ultimate design of their voyage, by bringing their respective ships safely into port. To the assistance of such, the following observations are intended to contribute : they are founded on experience, and will, if properly observed, prove highly serviceable, especially when long nights, or thick weather, augment those dangers which attend the Channel navigation.

" Ships, in approaching the Channel from a long passage, should not only try for soundings in time, but run, if possible, in the latitude of 49° 25′ North. Having, in that parallel, got soundings in 82 fathoms, fine white sand, with black and yellow specks, you may be sure that you are near the outer edge of the bank; and about 50 leagues to the westward of Scilly. By running 16 or 17 leagues further to the eastward, in the same parallel of latitude, you will have 90 fathoms, fine white sand; and continuing to run four leagues more to the eastward, you will shoal your water to 82 fathoms. Soon afterwards, you will have 72 and 75 fathoms, fine white sand, with sometimes a mixture of green; and in proceeding 16 or 17 leagues farther to the eastward in this latitude, you will have 72, 75, 77, and 80 fathoms. The soundings will be, for the most part, fine sand, but different in colour; some of them will be white sand, mixed with yellow specks; and others fine green sand, with some mud. In the latitude of 48° 23′ North, and 61 leagues to the westward of Ushant, lies the Nymph Bank. It stretches about S. S. E. and N. N. W. 12 leagues in length and four in breadth; and has 64 fathoms on it, fine grey sand.

* * *

The following are the Soundings in the Parallels of 48° 20′ and 48° 30′ with their several Depths of Water and Distances from the Island of USHANT.

Dist. from Ushant.	QUALITY OF THE SOUNDINGS.	Depth in Fathoms.
Leagues.		Eng. Fathm's.
52 —	Fine Grey sand, mixed with black - - -	82
49 —	Fine grey sand, mixed with small shells and broken bits - - - -	94
46 —	Grey sand, mixed with bits of brown shells	98
43 —	Grey sand, mixed with bits of shells and brown sand - - - -	96
40 —	Grey sand, mixed with bits of shells and gravel	104
37 —	Grey sand, mixed with shells and gravel - -	92
35 —	Grey sand, mixed with small cornet shells -	98
32 —	Sand mixed with gravel shells, & small cornets	96
29 —	Whitish grey sand and flat stones - - -	96
24 —	Light grey sand, with bits of shells - - -	89
21 —	Coarse sand, with bits of cockle shells -	87
18 —	Light grey sand, with bits of brown and yellow shells, and small stones - -	80
15 —	Light grey sand, mixed with barley-beards	75
14 —	Whitish grey sand, bits of shells & fine cornets	71
11 —	Light grey sand, mixed with barley-beards and small shells - - - - -	70
9 —	Fine grey sand, with bits of shells - - -	67
8 —	Grey sand, spotted with red, and mixed with bits of shells - - -	67
6 —	Whitish coarse shining sand, with fine shells	62
4 —	Whitish coarse shining sand, mixed with barley-beards and coral - - -	58
—	Whitish coarse sand - - - - - - -	57

When running for the Channel in latitude 49° 25′, which is the best latitude, and you have run so far to the eastward as to shoalen your water to 65 or 67 fathoms and the soundings are shells and small yellow stones or red sand, you may thence conclude that you are abreast of Scilly; or if you have 68 fathoms, white sand with grey specks, and sometimes shells and stones, Scilly will then bear about N. E. from you, distance 10 leagues. Your soundings will always inform you whether you are to the northward or southward of Scilly. In the latitude of Scilly you will have oozy ground, in 60, 65, 75 or 80 fathoms. W. N. W. 10 leagues from Scilly, lies Jones's Bank, on which you will have but 30, 35, and 40 fathoms; and, a little to the southward of it, you will have 72 and 75 fathoms. In running for the Channel, in the latitude of 49° 30′, you will have the following depths of water and soundings, when you are abreast Scilly; namely, 60 fathoms, oozy and broken shells; 64 fathoms, white sand with grey specks; 65 fathoms, shells and stones; and 55 fathoms, fine grey sand. The soundings near Scilly are very different from all others in this latitude: pieces of rotten rock, as broad as a small bean, and of a stone colour, will come up with the lead, which will not be the case any where else in the same parallel. More to the southward you will have deeper water, with fine sand, interspersed with black specks like ground pepper. In the night or in foggy weather, you should come no nearer to Scilly than 60 fathoms; for in that depth, you will not be more than six or seven leagues from it. Abreast of Scilly in the latitude of 49° 20′, you will have 70 fathoms, branny, or yellow and white sand; and, to the eastward of Scilly, in the latitude of 49° 8′ you will have 56 or 58 fathoms, coarse sand. You should then steer more to the northward; and endeavor to make the land about the Lizard; you may safely make it in the night, as well as in the day, if the weather be clear; for the light-houses stand so high, and the coast is so clear, that you may without danger, come within half a mile of the point. If the weather prove so thick that you cannot safely make the land, come no nearer to the Lizard than 45 fathoms; for, in that depth, you will not be more than three leagues off the point: your soundings there will be pebble stones and scallop shells.

Ships, when coming into the Channel, ought always, if possible to make the land about the Lizard; and should they afterwards meet with thick weather, they will not only know how to steer, but also how they advance up the Channel, which will become more and more necessary in proportion to the contraction of its boundaries. Some have contrary to their expectations, got on the south side of the Channel.—This error is greatly owing to the strong indraught between the islands of Guernsey and Jersey, and the coast of Britany, which ought always to be guarded against, especially in thick weather. It frequently happens that ships, coming into the Channel, have not had an observation for some days back, which together with the operation of scant and contrary winds, and the setting of the tides, tend to perplex and bewilder the most experienced mariner, when thick weather prevents him from getting a sight of the land. The variation of the compass in the entrance of the Channel, is nearly 27° W.; but as the variation is continually increasing at the rate of about a degree in every five years and a half, it will be necessary to add eleven minutes for every year, subsequent to the year 1813, which will give you the true variation at any time pretty exact.

THE METHOD OF EXERCISING MERCHANT SHIPS' COMPANIES FOR WAR.

IT is not presumed, in the following pages, to offer any hints to the officers in the Navy, who may be said to be trained up in the school of war: we only attempt the humbler task of suggesting a few observations to the commanders of merchant ships, who, occupied in commercial pursuits in time of peace, are sometimes deficient in the method of defending themselves when attacked in time of war. We would first recommend to station their crews according to their rank and capacities, by forming a quarter-bill, and to exercise them in their respective stations. As merchant ships are so variously fitted out with guns and men, it is impossible to form a quarter bill to suit all. We have, however, given two quarter bills, one for a trading ship, of fourteen six-pounders, and fifty men, and the other for a privateer, of twenty nine-pounders and 160 men, which may be varied as circumstances and the difference of guns, carriages, and men, may require.

A Quarter Bill for a Trading Ship, of fourteen six-pounders and fifty men.

The captain to command in chief, on the quarter-deck, if it be fortified to afford common shelter from small arms - - - - - -	1
The chief mate to command the six foremost guns, and work the ship forward - - - - - - - - - - - - - - - - -	1
The second mate to command the eight aftermost guns - - - -	1
The boatswain to pass the word, and get the captain's orders executed fore and aft, as occasion may require - - - - - - - -	1
The carpenter to attend the pumps, shot-plugs, &c. - - - - -	1
The gunner to deliver the powder to the boys, as carriers - - -	1
The doctor in the lowest, safest, and most convenient place the ship affords - - - - - - - - - - - - - - - - - -	1
A good man at the helm - - - - - - - - - - - - - - - - -	1
Four men to each gun and its opposite, and a boy to fetch powder,	35
Seven men at small arms and occasional duty - - - - - - - -	7
	50

A Quarter Bill for a Privateer, of twenty guns, nine pounders, and four three pounders on the quarter deck and forecastle.

The captain to command the whole - - - - - - - - - - - -	1
The master to assist and work the ship according to orders - -	1
A midshipman to pass the word of command fore and aft - - -	1

A quarter-master at the gun, and another at the helm	2
The first marine officer with 24 musketeers	25
Three men for the two three-pounders, and a boy to fetch powder	4

On the Main Deck.

The first lieutenant to command the ten foremost guns	1
The second lieutenant to command the ten aftermost guns	1
The gunner to assist and attend all the great guns fore and aft	1
The two master's mates to attend the fore-topsail braces, and work the ship forward according to orders	2
The boatswain's mate, with two seamen, to assist in working the ship, and to repair the main rigging	3
The carpenter and his crew to attend the pump, and the wings about the water's edge, fore and aft, with shot plugs, &c	4
Six men to each of the ten guns on a side, and its opposite, and a boy to fetch powder	70

On the Forecastle.

The boatswain to command, with two seamen to work the ship and repair the fore-rigging	3
Three men, and a boy, to fetch powder, for the two three pounders	4
The second marine officer, with nine musketeers	10
In the barge upon the booms, the third marine officer with eight musketeers	9
In the main top, five men with a midshipman at small arms, and to observe the conduct and condition of the enemy	6
In the fore top, five men at small arms, and to repair the rigging	5
In the mizen top, three men at small arms, and to repair the rigging	3
In the powder-room, the gunner's mate with an assistant to fill and hand powder to the boys, carriers	2
In the cock-pit, the doctor and his mate	2
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Here it may not be amiss to remark, that the people should be quartered to fight nearest to where they are stationed to work the ship; that is, the after-guard on the quarter deck, the waisters in the waist, forecastle men that are necessary in the forecastle, &c. The quarter bill and discipline of the crew should be kept from disorder as long as possible; and when occasional duty requires the people to be let go from their quarters, it should not be done at random, but with judgment, such as will suit the occasion, from the musketeers, or a man from each great gun, &c. where they can be best spared.

On preparing for Exercise or Action.

When all hands are called to quarters, every man should bring his hammock well lashed up, and stow it to the greatest advantage to give shelter from small arms nearest to his own quarters, or give it to some of his messmates where they are most wanted, that they may know readily where to find them when exercise or action is over.

When the hammocks are properly stowed, the officers, according to their stations and duties, are to see the ship effectually cleared of all incumbrances, and every thing prepared, so that nothing may be wanting that is necessary for exercise or action.

The lieutenants or mates, with the gunner on the gun deck, are to get all the hatches laid, except that where the powder is to be handed up; a match tub half filled with water, and four matches in the notches, placed as near midship as possible to serve two guns and their opposites; also swabs to wet the decks, to prevent the fatal consequences that may attend the scattered and blown powder from the priming of the guns making a train fore and aft, which has, in many instances, taken fire from the firing of the guns, and done great damage. It is further the duty of the lieutenants to see that the captain of each gun has his men, powder-horn, rope-spunge, rammer, crows, handspikes, and train tackles, all ready in their proper places.

The boatswain must get the yards slung, the topsail sheets stoppered, and marlinespikes ready to repair the standing or running rigging that may be damaged.

The carpenters are to get the pumps rigged, and shot plugs, with all that is necessary, ready in their proper places, to stop leaks and repair damages.

The gunner, when preparing for action, is to see that the charges in the guns are dry, and that there is a sufficient quantity of wads, and shot of all sorts, and cartridges ready filled.

The marine officers are to see all the musketeers at their quarters, with their arms and ammunition in good order for exercise or action.

Exercise of the Great Guns.

1 Silence,
2 Cast loose your guns,
3 Level your guns,
4 Take out your tompions,
5 Run out your guns,
6 Prime,
7 Point your guns,
8 Fire,
9 Spunge your guns,
10 Load with cartridge,
11 Shot your guns,
12 Put in your tompions,
13 House your guns,
14 Secure your guns.

1. Silence.

At this word every one is to observe a silent attention to the officers.

2. Cast loose your Guns.

The muzzle lashing is to be taken off from the guns, and, being coiled up in a small compass, is to be made fast to the eye-bolt above the port, the lashing tackles at the same time to be cast loose, and the middle of the breeching seized to the thimble of the pomillion. The spunge to be taken down, and with the crow, handspike, &c. laid upon the deck by the gun.

N. B. When prepared for engaging an enemy, the seizing within the clinch of the breeching is to be cut, that the gun may come sufficiently within board for loading, and that the force of the recoil may be more spent before it acts upon the breeching.

3. Level your Guns.

The breech of your metal is to be raised, so as to admit the foot of the bed being placed upon the axle-tree of the carriage, with the quoin upon the bed, both their ends being even one with the other.

N. B. When levelled for firing, the bed is to be lashed to the bolt which supports the inner end of it, that it may not be thrown out of its place by the violence of the gun's motion, when hot with frequent discharges.

4. Take out your Tompions.

The tompion is to be taken out of the gun's mouth, and left hanging by its laniard.

5. Run out your Guns.

With the tackles hooked to the upper bolts of the carriage, the gun is to be bowsed out as close as possible, without the assistance of crows or handspikes; taking care at the same time to keep the breeching clear of the trucks, by hauling it through the rings; it is then to be bent so as to run clear when the gun is fired. When the gun is out, the tackle-falls are laid along-side the carriages in neat fakes, that when the gun, by recoiling, overhauls them, they may not be subject to get foul, as they would if in a common coil.

6. Prime.

Take off the apron and unstop the touch-hole, that the cartridge may be pierced with the priming-wire, and the touch-hole filled with powder; the pan also is to be filled; and the flat space, having a score through it at the end of the pan, is to be covered, and this part of the priming is to be bruised with the round part of the horn. The apron is to be laid over, and the horn put up out of danger from the flash of the priming.

7. Point your Guns.

At this command the gun is, in the first place, to be elevated to the height of the object, by means of the side sights; and then the person pointing is to direct his fire by the upper sight, having a crow on one side, and a handspike on the other, to heave the gun by his direction till he catches the object.

N. B. The men who heave the gun for pointing are to stand between the ship's side and their crows or handspikes, to escape the injury they might otherwise receive from their being struck against them or splintered by a shot; and the man who attends the captain with a match is to bring it at the word, "Point your guns;" and kneeling upon one knee opposite the train truck of the carriage, and at such a distance as to be able to touch the priming, is to turn his head from the gun, and keep blowing gently upon the lighted match to keep it clear from ashes. And as the missing of an enemy in action, by neglect or want of coolness, is most inexcusable, it is particularly recommended to have the people thoroughly instructed in pointing well, and taught to know the inconveniences of not taking proper means to hit their mark; therefore they should be made to elevate their guns to the utmost nicety, and then to point with the same exactness, having caught the object through the upper sight. At the word,

8. Fire.

The match is instantly to be put to the bruised part of the priming; and when the gun is discharged, the touch-hole is to be stopped, in order to smother any spark of fire that may remain in the chamber of the gun; and the man who spunges is immediately to place himself by the muzzle of the gun in readiness, when at the next word,

9. Spunge your Guns.

The spunge is to be rammed down to the bottom of the chamber, and then twisted round, to extinguish effectually any remains of fire; and when drawn out to be struck against the outside of the muzzle, to shake off any sparks or scraps of the cartridge that may have come out with it, and next, its end is to be shifted ready for loading; and while this is doing, the man appointed to provide a cartridge, is to go to the box, and by the time the spunge is out of the gun, he is to have it ready; and at the word,

10. Load with Cartridge.

The cartridge (with the bottom end first, seam downwards, and a wad after it) is to be put into the gun, and thrust a little way within the mouth, when the rammer is to be entered; the cartridge is then to be forcibly rammed down, and the captain at the same time is to unstop the touch-hole, and keep his priming-wire in the touch-hole, and, feeling the cartridge, is to give the word *Home*, when the rammer is to be drawn and not before. While this is doing, the man appointed to put in a shot is to provide one, or two, according to the order at that time, ready at the muzzle, with a wad likewise, and when the rammer is drawn, at the word,

11. Shot your Guns.

The shot and the wad upon it are to be put into the gun, and thrust a little way down, when the rammer is to be entered as before. The shot and wad are to be rammed down to the cartridge, and there have a couple of forcible strokes, when the rammer is to be drawn, and laid out of the way of the guns and tackles, if the exercise or action be continuing, but, if it be over, the spunge is to be secured in the place it is at all times kept in, the stopper put in the touch-hole, and the apron put on.

12. Put in your Tompions.

The tompions are to be put in the muzzle of the cannon.

13. House your Guns.

The seizing is to be put on again upon the clinched end of the breeching, leaving it no slacker than to admit of the gun's being housed with ease. The quoin is to be taken from under the breech of the gun, and the bed, still resting upon the bolt, within the carriage, thrust under, till the foot of it falls off the axletree, leaving it to rest upon the end which projects out from the foot. The metal is to be let down upon this. The gun is to be placed exactly square, and the muzzle is to be close to the wood, in its proper place for passing the muzzle lashings.

14. Secure your Guns.

The muzzle lashings must be first made secure, and then with one tackle (having all its parts equally taut with the breeching) the gun is to be lashed. The other tackle is to be bowsed taut, and by itself made fast, that it may be ready to cast off for lashing a second breeching.

N. B. Care must be taken to hook the first tackle to the upper bolt of the carriage, that it may not otherwise obstruct the reeving of the second breeching, and to give the greater length to the end part of the fall. No pains must be spared in bowsing the lashing very taut, that the guns may have the least play that is possible, as their being loose may be productive of very dangerous consequences. The quoin, crow, and handspike, are to be put under the gun, the powder-horn hung up in its place, &c.

Being engaged at any time when there is a large swell, a rough sea, in squally weather, &c. as the ship may be liable to be suddenly much heeled, the port tackle-fall is to be kept clear, and (whenever the working of the gun will admit of it) the man charged with that office is to keep it in his hand; at the same time the muzzle lashing is to be kept fast to the ring of the port, and being hauled taut, is to be fastened to the eye-bolt, over the port-hole, so as to be out of the gun's way in firing, in order to haul it, in any time of danger.

This precaution is not to be omitted, when engaging to windward, any more than when to leeward, those situations being very subject to alter at too short a warning.

A train tackle is always to be made use of with lee guns, and the men stationed to attend it, are to be very careful in preventing the gun's running out at an improper time.

THE METHOD OF ATTACKING OR DEFENDING A SHIP.

AS soon as the ship has got to sea, I would recommend to take the first favorable opportunity to have all hands called to quarters, the officers in their stations to have every thing made properly ready and fit for action; to have a general exercise not only of the great guns and small arms, but the method of working and managing the ship, to take advantage of the openings which often occur in attacking or being attacked by another single ship, which should be studied by every commander, and the designed manœuvres should be taught the people in their general exercise, that they may know how to act and move regularly from one place and side to the other, as occasion may require, without confusion, which is always the case when the intended manœuvres are not made known to the people.

For these reasons, as soon as possible, it should be made known to them, that if a ship of nearly equal force should bring-to with a design to fight; it was intended not to run directly alongside, and lie-to like a log, and depend upon mere battering with one side only, or upon the stern chase-guns. Begin the attack upon the weather quarter, shooting the ship up in the wind, with the helm a-lee, till the after lee gun, with which you should begin, can be brought to bear upon the enemy's stern, then fire the lee broadside. Immediately boxhaul the ship round on her heel, so as to bring the wind so far aft, that the ship may be steered close under the enemy's stern, giving particular orders to begin with the foremost gun to rake them fore and aft, as they pass in that line of direction, all aiming and firing to break the neck and cheeks of the rudder's head, the tiller ropes, blocks, &c. so as if possible to destroy the steering tackle, which design, if it prove successful, takes the management of their ship from them, so that she must lie helpless for a time in spite of their endeavours.

When the aftermost gun is fired, put the helm hard a-weather to bring the ship to the wind on the other tack, to keep clear of their lee broadside, and act according to their motions and the experience of the effect your attack has had upon them. If they continue to lie-to, either renew the attack in the same manner as soon as the ship will fetch the weather quarter again, or make sale off to escape, if it be found that the great inequality of their superior force admits of no possible chance of conquering them. And although this manœuvre may not have given this advantage (which in my opinion ought always to be attempted, and not to submit tamely although a ship is double the force) yet the power of their broadsides may be chiefly avoided by it.

But when the inequality of force is not so great, but there is a possibility of conquering, and if the success of the first attack be perceived to oblige the enemy to continue lying-to, in order to repair the damage done their rudder or tiller, &c. then the blow should be followed, by renewing the attack with all possible expedition, in the same manner, which gives the opening not only to fire the whole round of great guns to advantage, but also to the marines and topmen to fire their small arms at the same time to great advantage, so as to do the most execution possible, by firing and raking them fore and aft through their most open and tender part, the stern, with the least risk possible from the enemy's guns, and therefore gives the greatest possible chance to make an easy conquest, especially if so lucky as to destroy and prevent the recovery of their steering. A ship of much superior force may be brought to such a distressed condition, as to be obliged to make a submission for want of the helm to command her; therefore when an opportunity offers in fighting, this should be always aimed at.

But suppose the enemy, laid-to as above mentioned, find themselves not much hurt by this manœuvre, and that you have not succeeded in destroying their steering, and therefore you may expect that they will immediately tack or wear ship, and stand after you, depending upon their superior sailing and force, shall run up along your lee side, expecting by making a general discharge of their small arms and great guns on your deck, which lies open to them by the ship's heeling, to destroy your people, and to make you submit: when this is likely to be their design, orders should be given to your people, to keep themselves as close under shelter as possible from their small shot until their general discharge is over; then if the ship is found not so disabled, but that the topsails can be thrown aback, make a general discharge from the lee side of the great guns, loaded with round shot only, pointed to the weather side of the enemy's bottom amidships, to one point at the water edge, and boxhaul the ship to run close under their stern, aiming at raking and destroying their steering with the other broadside; then stand off on the other tack, and act according to circumstances and the condition you find yourself in compared with the appearance of the enemy and their motions, who may be obliged to continue on the other tack to repair damages.

But when the enemy's ship of force makes only a running fight, and you have the advantage of sailing faster, the most sure and likely method to make an easy conquest, is to run close up, and shoot or sheer your ship across their stern each way, making a general discharge of all your force, aiming with the great guns at the rudder-head and steering tackling; and you will have this advantage, that if the shot miss the rudder-head, by raking the ship fore and aft through the stern, they may do the greatest execution possible to distress the enemy, so as to make a submission. On this occasion, when it blows fresh, and you are obliged to carry a pressing sail large or before the wind, to make the great guns as ready as possible, and prevent their being fired too low, all their breeches should be laid quite down in the carriage, and if your ship is crank, the yards should be braced so as to shiver the sails at the time each broadside is fired. In all these manœuvres, where the whole round of great guns are designed to be fired, two or more men ought always to be left to load each gun again when fired on one side, whilst the others move over again to fire the opposite, that neither side may be left unguarded.

These or any other manœuvres may be taught the people, by heaving a tight empty beef-cask over-board, and making it the object of attack. Nor would I advise to spare a little powder on these occasions; as a little expended in exercise may save a great deal fired to no purpose in action. Two ships sailing in company, afford an excellent opportunity of performing manœuvres.

ON SHIPS IN DISTRESS.

SUDDEN distress of ships has often struck their crews with such a panick, as to occasion them, in many instances, to take the worst, instead of the best means or methods for their safety or relief. It will not, therefore, I trust, be unacceptable to endeavor to point out every thing that may be of service on these melancholy occasions, as far as circumstances and situations can be conceived to happen.

When a ship proves weak and works the oakum out, so as to make dangerous leaks between wind and water, it has been frequently practised to nail sheet lead upon the seams, which is subject to break by the ship's working. Leather or canvass nailed on slack, with oakum under, will answer the purpose much better. In cases where ships have worked their frames loose, it has been frequently practised with success, to take several turns of a hawser or cable round them, and to heave these turns well taut, to prevent foundering.

Should a dangerous leak suddenly break out, as soon as the pumps are manned and set to work, the utmost endeavors should be immediately used, and all possible means tried to find out and stop the leak, before the people become exhausted by continual pumping; when discovered I would recommend fothering.

To recover and get a ship upright from being overset or laid on her side at sea.

This is certainly a task that deserves the utmost attention. If ground is to be reached by any means, the lee anchor or anchors should be immediately let go, in order to bring the wind upon that bow that is laid down; that the wind may act upon the masts and sails, which may be set so as to bring the ship upright again. But in deep water, where anchors can be of no service, it is recommended, if a tow-line, hawser, or cable end, can be readily come at, and if the driver boom, hen coops, or any other bulky things, can be slung by the middle with ropes, and made fast to it, that they be veered away with a long scope over the lee-quarter, to make such great stop-waters as to make the ship wear, and bring the wind on the quarter that is down, that the ship may be brought-to on the other tack, and the sails trimmed, so as to get her upright again without cutting away the masts, which nothing can justify but the utmost necessity, to save a ship from foundering; because of the great distress it brings her under for want of her masts, especially her lower masts, when she has a long run to her destined port, or to a place where she can get this great damage repaired.

To make a ship wear and steer that has lost her foremast.

This may be done by veering a hawser or cable end over the lee quarter, but without any stop-waters, only the nun-buoy or any spare spars lashed along it to buoy it from taking the ground, in case of coming into shoal water with little wind. This will act with great power with the helm, to make the ship wear and steer at pleasure. And a spare yard or boom may be rigged out abaft the mizen shrouds, to guy the cable to leeward in proportion to the ship's griping; and when sailing before the wind, to secure it over the middle of the stern, will prevent the ship's broaching-to against the helm both ways.

On steering a ship that has lost her rudder.

I would propose on this occasion, a hawser or cable-end with the nun buoys, spare spars, &c. lashed along it, to buoy it up, in case of coming into shoal water, and a boom rigged out on each side, close aft athwart the stern, with a block on each at equal distances, as far as they can be supported from the stern, and a block on the rail or gunnel exactly opposite the middle of the wheel barrel, where the steering rope, marked with a rope yarn in the middle, is to be taken with three or five turns round the wheel, when the midship spoke and the mark on the rope are right up; then the two ends to be passed across from the under part of the wheel and reeved through the blocks on each side, and made fast to the hawser or cable that is towed astern, exactly amidships, and as tight as it can well be to go clear of the stern; and then veer and heave freely from side to side, as the steering of the ship, with the trimming of the sails on this occasion, may require.

[See the plate and description of Captain Peckenham's Makeshift Rudder, published in the 7th volume of the Transactions of the Society of Arts, Manufactures, and Commerce, which is earnestly recommended to the attention of all commanders.]

On preserving boats from foundering when ships founder.

Sling any mast, yard, or spar, the longer the better, by each end, the span to be twice the length of the boom; bend the boat rope exactly in the middle of the span, which need not be above 10 fathom long; let your boat drive end on under the lee of this boom, which will break off the violence of the sea from her.

On a ship being near a dangerous lee-shore.

To keep a ship off a dangerous lee-shore, every effort of mind and body should be exerted, as being the only chance to save the lives of the crew and property on board. Carrying such sail as will give her good way through the water upon a wind, as long as she will carry it, is certainly the best method to effect this purpose; it is also advisable to reduce all top-hamper that holds wind as much as possible; for if the shore proves so deep, or the bottom so rocky, as not to afford safe anchorage, their safety may depend entirely on carrying sail.

Suppose in this situation it be found that the ship will not clear the shore on either tack, and after the utmost endeavours, she is perceived to lose ground; but as there is no anchorage, there are no other means but to continue turning to the last, as the wind may abate, or may vary or change in your favor, even when you think it is the last tack you can possibly make before you must inevitably go on shore.

But when it happens that there is clear anchoring ground at a good distance from the shore, and sailing proves ineffectual to keep clear of it, then the chief dependence must be upon the ground tackle applied to the best advantage.

Suppose then the ship to be properly prepared, and to have let go a kedge anchor and tow-line bent like a buoy-rope to the crown of the stream anchor, and the inner end of the stream-cable bent to the crown of the best bower or sheet-anchor, with a long scope of cable to make the ship ride safe and easy; where it is known, or found by sounding with the lead armed with tallow, that the ground is foul, then no more cable should be veered out than necessity requires to bring the ship up, to ride with as short a scope as possible, because the cable is liable to be cut or chafed; if that happen there is then the more room astern, and a better chance for a second or third anchor, trying to the last moment all possible means to keep the ship from the shore.

Where the water is so deep that the anchoring ground lies but a little more than a cable's length from the shore, then all the anchors should be let go to the most advantage. To put this difficult performance in practice, I would recommend to get the square sails handed with all possible dispatch, but to keep the fore topmast, main, and mizen stay-sails set, the yards braced full, and the helm put hard aweather to keep headway upon the ship, shooting her along the shore as much as possible till all the anchors are let go, beginning with the weathermost anchor, or that which has the cable in the weathermost hawse hole, and so on with the next weathermost anchor, paying out the cable as fast as possible, that the ship may keep shooting ahead till all the anchors are let go. And when the necessity of the situation requires it, no hesitation should be made immediately to cut away all the masts except the foremast and the bowsprit (the fore topmast stay-sail being made to hoist to the foremast head) which will not only make the ship ride with less strain upon the anchors and cables, but if they give way she will be the better prepared, when necessity requires it to be done, as the last refuge, to run and lay the ship on shore to the best advantage, in order to save all the lives and property that is possible to be saved, rather than let the ship founder, or strike the ground at an anchor by the tide falling, &c. which affords no chance of saving either lives or property.

On ships being forced on a dangerous lee-shore.

Situations, circumstances, times, and places, are so different and various, that to give advice on this dreadful occasion is difficult. The best management on a gradual rising shore, in a tidesway, is to use all possible means to keep the ship from going on shore till after high water, and the main and mizen mast being first cut away, then to run right before the wind and waves with all the canvass that possibly can be set, end on upon the shore, to make the ship free herself the more, and to run the higher and faster upon the ground, so that by the advantage of the tide falling, she may soon be set so fast as to be out of the power of the waves to hurt her much. By this management, in my opinion, not only all the lives, but the ship and cargo may be often saved, which would be all lost by letting her go at random with a flowing tide. For it must be considered, that a ship going on shore in a tidesway upon a flood, will continue beating as long as the tide flows, and until it falls; and if she lies broadside to the waves, they will have about three times more power on her than when she is laid end on to them; and a ship will bear but little beating on her broadside in proportion to what she will bear upon her bottom.

Notwithstanding a ship may be thus successfully run and set fast upon a shore with little damage to her hull, and no danger to be apprehended till towards high water next tide, if the storm continue so long, yet people too often let their fears overcome their reason, and, being in too great hurry to quit the ship, and attempting to get on shore through the waves, may often lose their lives; when if they wait till low water, they might get on shore with little or no risk; and where the rise and fall of the tide is great, the ship may become quite dry at low water; therefore the people should be restrained from going on shore with the boats, till towards low water; and when got safe on shore, it may be absolutely necessary, in order to preserve the boats, to haul them above high-water mark, where they may be turned bottom up, and made a place of shelter when there is no other to be had, and be still ready to go to the ship, if the weather permit and occasion require.

Different shores require different management on this dreadful occasion. And where the shore is nothing but hard rocks and steep, and under water, and high cliffs above water, which it is impossible to ascend, in this situation no sail can be of any service; therefore all the masts should be cut away, and safety then depends entirely on the ground tackle being used to the best advantage; and if the ship drives till she comes near the high cliffs, it is well known they make both the wind and waves rebound from them to some distance, where if the ground tackle happen to hold, it may give the ship a chance to ride.

On saving lives from a ship lost on a lee-shore.

TO aid and assist in saving the lives of people from ships that are forced on a dangerous lee-shore, must be allowed to be one of the greatest acts of humanity. Times, circumstances, and situations, are so various, that it is very difficult to write what may be to the purpose on this melancholy occasion. Success in many situations may depend greatly on assistance from people on shore; but as that is uncertain, and cannot be expected in the night, or in desert places, or where a current or tide runs so strong between the ship and the shore as to prevent booms, masts, yards, &c. with ropes made fast to them, from being veered on shore, in this case, the utmost endeavors should be used on board, and every method tried to convey the people on shore. Let the experiment of a *Flying Storm Kite* be made, that may by the force of the wind, carry an iron creeper or grappling made fast to the end of a rope from the wreck to the shore, by which access may be got to the shore, when prevented by the tide, current, or returning waves. I would propose these kites to be such as may be easily and readily made on board any wrecked vessel, and to consist only of two slips of thin deal board, about three inches broad, the long piece to be 7, 8, or 9 feet long, according to the weight of the creeper, grappling, or boat's anchor, and the rope designed to be sent on shore, and the cross piece about half the length of the long piece, to be nailed about a third from the top that forms the kite, to be spanned with log or lead line from the four ends of the boards, and covered with a piece of light sail, and slung from the four ends of the boards, and strengthened with a span in the middle to the lower part of the cross board, where the kite rope is to be seized, and at the lower end of the kite a rope 2, 3, or 4 fathoms long is to be bent to the grappling, creeper or boats anchor, to answer the purpose of a kite's tail. Then it may be asked, how the kite may be made to fall so low that the anchor, &c. may take hold of the ground. if necessity require this immediately to be done? Let the kite-rope run loose for a time, and the weight of the anchor, rope, &c. will immediately make it fall to the ground; and by the kite line a larger rope may be hauled on shore by the inhabitants, and fixed so that not only lives but property may be saved by it.

But in order to get a grappling on shore, another experiment might be made, viz. to shoot it with a rope bent to it, lashed along the outer end of a handspike, made round just to fit the bore of a great gun, and long enough to reach from the ring of the grappling to the wad next the powder; the gun elevated to its highest range.

Let it now be supposed that a rope is got from the wreck to the shore, and secured as well as possible, till somebody can be got on shore by it to secure it better. Make a bowling knot in the tail of the strap of a single block; then reeve the shore rope through the block and to that part of the wreck where it may lead and be hauled taut to the greatest advantage to support the block, travelling upon it from the wreck to the shore in the surest and best manner possible; and if the wreck have any lower masts standing, the shore rope leading over the main-mast head would most likely answer the purpose best and the top afford a convenient place to get fixed in, and go from, in the machine to the shore.

But the facility or difficulty attending the execution of these means, are in proportion to the height or distance of the shore from the wreck; if the shore be low and near the wreck, the shore rope may be made to lead the machine upon it, with an easy ascent from the wreck to the shore, with a man or two in it, without much strain either to the rope, or grappling on shore, : when this is likely to be the case, a line should be made fast to the machine to haul it to the wreck again; by which means it may happen that a shipwrecked crew may soon get on shore with ease and safety.

But when the shore happens to be at a great distance, and higher than any part of the wreck, this experiment will of course be attended with more difficulty. In order, therefore, to ease the strain on the shore rope and grappling, fix a small sail to the machine, such as a hammock or two, &c. : this, set as a sail upon the machine that is to run right before the wind in a storm, will certainly help greatly to lift and lessen the strain of the machine on the shore rope, and force it forward with great power towards the shore. A man or two sent ashore by these means, may greatly contribute, by making things secure on shore, to the saving the whole crew, before the ship goes to pieces.

But supposing the ship to be wrecked where there is neither tide nor current to prevent any thing that will float being driven on shore by the waves; in this case a tow-line, or any suitable rope, with a hauling line, may be made fast around the middle of a spar, and veered away on shore as far as it will go; and if it happens to be an uneven rocky shore, it may chance to fix itself among the rocks. But if it be a sandy or gravelly shore, then no such chance can be expected; it will then require some people on shore to haul it up, and put it under the sand or gravel, with its broadside to the wreck, to make it bear the strain that is necessary for the rope to be tight enough for the machine to travel upon, from the wreck to the shore.

Before concluding this article we will give a description of the *Marine Spencer*, presented to the Royal Humane Society of London, by Mr. Knight Spencer, believing it may be of use in many instances.

The Marine Spencer is a girdle of a diameter to fit the body, six inches broad, composed of about 800 old tavern corks strung upon a strong twine, well lashed together, covered with canvass and painted in oil, so as to make it water-proof. Two tapes or cords about two feet long, must be fastened to the back of the girdle, with loops at the ends. Another tape or cord, about three feet long, in the middle of which a few corks are strung covered with canvass, and painted as above, must also be fastened to the back of the girdle. Two pins of hard wood, three inches long and half an inch in diameter, must be fastened to the front of the girdle, one to the upper, the other to the lower part. When the Marine Spencer is to be used, slide it from the feet close up under the arms; bring the two tapes or cords one over each shoulder, and fasten them by the loops to the pin on the upper part of the front of the girdle; bring the other tape or cord between the legs, and fasten it to the other pin.

A person thus equipped, though unacquainted with swimming, may safely trust himself to the waves; for he will float head and shoulders above the water in any storm, and by paddling with his hands, may easily gain the shore.

A Marine Spencer constructed as above, and covered with strong canvass unpainted, will have nearly the same buoyancy, though more liable to damage from the effects of sea-water.*

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* There is now in use a Leather Girdle, to which, when filled with air, is given the name of Life Preserver. Life Boats are also in use.

Directions for restoring the drowned, those apparently deprived of life by the cord, by lightning, or by intense cold.

Apparent death from drowning.

1. Untie the neckcloth, and strip off the clothes immediately; wipe the body, and cover it, in cold or damp weather, with a blanket or any woolen garment, or the clothes of some person present, and convey it carefully and expeditiously, with as little agitation as possible, to the nearest house; it may be carried either in men's arms, or upon a door or hurdle, *with the head raised and the body inclined to the right side;* should the house be at a distance, a cart, if it can be procured, will be the best method of conveyance.

2. Lay the body *(the head still raised)* on a bed or matrass, or on a low table covered with folded blankets. Cover it with warm ashes; the warmth and alkaline being useful. In winter, place it at some distance from the fire; in summer, near the window, and if possible in the sun, taking especial care that no more than six people be allowed to remain in the room at any one time, as a greater number might prevent the return of life; these six may be divided into two sets, one set being active in restoring the warmth of the body, whilst the other is employed in recovering the breathing.

3. Close the mouth and one nostril, whilst another person blows into the other nostril by means of a pair of bellows, or by his breath, if bellows be not at hand, with sufficient force to fill the lungs with air; which being done, the person who has the charge of the mouth and nostrils, should suffer a small quantity of air to pass through them at least every minute, by taking the hand off from these parts, and placing it on the chest, which should be pressed gently for a few seconds so as to expel the air; thus the natural breathing will be imitated. After the lungs have been thus carefully filled and emptied repeatedly, *(and not before)* rub well the whole body, *particularly the right breast,* the hand being softened occasionally with oil or hog's lard, either of which is better than flour of mustard, salt, or spirits, which are highly injurious.

4. This plan of filling and emptying the lungs, should be regularly continued if necessary, four hours, during which time let a third person apply to the feet and hands bladders or bottles of hot water, or warm tiles wrapped in flannel, moving lightly up and down the back every now and then a warming pan, covered with flannel or some garment; and when signs of returning life appear, put into the mouth a table-spoonfull of warm wine and water, or warm brandy, rum, or gin and water, and give the same quantity every five or ten minutes, till one or two gills be consumed; after which, the senses and breathing being tolerably restored, put the person in a warm bed, and suffer him without disturbance to fall asleep. Should the person be incapable of swallowing, the liquor should be passsd into the stomach with the elastic tube and syringe.

5. It is to be observed, that as soon as the pulse at the wrist or ancle, or beating of the heart, can be felt, the inside of the nostrils ought

to be touched occasionally with a feather dipped in spirits of hartshorn, or strong mustard; it being found by experience, that any irritation applied to the nose has considerable influence in exciting the action of the muscles concerned in breathing.

The above directions (comprised in paragraphs 1, 2, 3, 4, and 5) assiduously followed, will be found sometimes sufficient for the recovery of the drowned: it is, however, strongly recommended, when gentlemen of the faculty can be obtained, that their assistance should be requested with all possible speed, as their skill will lead them judiciously to vary the mode of treatment, which is indispensably requisite on some occasions, particularly in apparent death from hanging, intoxication, &c. as noticed in the following pages."

Apparent death from Hanging.

1. The same measures should be pursued which are recommended for drowned persons; but the restoration of life will be facilitated considerably by opening a jugular vein, or by applying cupping-glasses to the neck.

2. The quantity of blood should seldom exceed an ordinary tea-cup full, which will generally be found sufficient to unload the vessels of the head.

Insensibility or apparent death from Drunkenness.

1. If the countenance continue swelled and of a dark red or purple hue, *after placing the body in an upright posture for five minutes*, blood should be taken from a jugular vein or temporal artery, or from the neck, by the application of cupping-glasses.

2. The pulse and breathing being perceptible, and the body warmer than natural, cloth dipped in cold water, and applied to the head and neck, have been found very serviceable, in restoring intoxicated persons to their senses, without the aid of bleeding.

3. An emetic may be early administered with great advantage, and a disposition to vomiting is to be encouraged by draughts of warm water, which should be introduced by the flexible tube and syringe, when the person is incapable of swallowing.

4. The emetic failing in its operation, a clyster may be injected, every quarter of an hour, if necessary.

5. The application of leeches to the temples, will sometimes prove very useful, and blisters to the inside of the legs and between the shoulders may be advantageously applied.

6. Vinegar and water, brisk cider or perry diluted with water, or two or three tea-spoons full of the elixir of vitrol in a pint of water, frequently afford great relief,

7. The body being cold, equal parts of spirit of hartshorn and sallad or common oil, or equal parts of rum, gin, or brandy and oil well shaken together, is an excellent application for the wrists, ancles, temples and chest, on which it should be well rubbed for a considerable length of time.

8. If these means should not succeed, no time is to be lost in trying the method, above advised, for drowned persons.

Apparent Death from Lightning.

Persons deprived of sense and motion by lightning, and not recovering in the space of a few seconds, have been, too often, supposed irrecoverably dead, although no marks of violence appeared on the body. Such conclusions are to be most cautiously avoided, as experience has repeatedly shown, in the complete recovery of many persons, who, besides the loss of sense and motion, have been severely injured externally.

1. The person should be removed into the open air, with the head raised, and the body inclined to the right side.

2. Cold water, in small quantities, thrown forcibly and repeatedly on the face and breast, and the body well rubbed, at intervals, with flannel cloths, have been attended with much benefit.

3. If the body feel cold, gradual warmth should be applied, as well as the means recommended for the drowned: but of all remedies in restoring warmth and energy, in cases of apparent death from lightning, *Galvanism or Electricity* is the most effectual, having this advantage, that it pervades the inmost recesses of the frame. On which account, let an electrifying machine be procured as speedily as possible, the other means being, in the interval, constantly employed.

Persons Frost-bitten, or apparent Death from Intense Cold.

1. The head being slightly raised, rub the body generally with ice, snow, or cold water.

2. Restore warmth by *slow* degrees, taking special care not to place the person before the fire, or near it.

3. Should no appearance of life be observed after these means have been assiduously tried for a quarter of an hour, have recourse to the means pointed out for the recovery of the drowned.

General Remarks.

Clysters are to be considered serviceable only as far as they coöperate with more important remedies, and those of a stimulating kind should be generally preferred.—The quantity ought not to exceed half a pint; lest by their mechanical action, they prevent the descent of the midriff, and thereby hinder the free expansion of the lungs.

Tobacco clysters are highly pernicious; so is tobacco in any form, as it has a powerful tendency to *destroy* rather than increase the powers of life.

The following clysters will answer almost every purpose:

Ether, a tea-spoonful given as a clyster—also, give it by the mouth. To a pint of warm water, add two tea-spoonsful of spirits of hartshorn, or a heaped tea-spoonful of flour of mustard, or a table-spoonful of the essence of peppermint; but if neither of these can be obtained, put to the same quantity of warm water, half a gill of brandy, rum or gin, or two table-spoonsful of common salt

Bleeding, if necessary, should be one of the first remedies; but can be proper only in persons of a full habit of body, or in those who have received an injury on or near the head.

Emetics should be dispensed with, unless it be ascertained that the stomach is oppressed with food or spiritous liquors. When required, give three or four table-spoonsful of ipecacuanha wine, or a table-spoonful of antimonial wine, or thirty or forty grains of ipecacuanha powder, or two grains of emetic tartar, dissolved in a wine-glass of water, either of which may be repeated, if necessary, every quarter of an hour.

Electricity will prove useful, in the hands of such persons as are thoroughly acquainted with the treatment of persons seemingly dead.

TABLE I. Difference of latitude and departure for ¼ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.0	61	60.9	03.0	121	120.9	05.9	181	180.8	08.9	241	240.7	11.8
2	02.0	00.1	62	61.9	03.0	122	121.9	06.0	182	181.8	08.9	242	241.7	11.9
3	03.0	00.1	63	62.9	03.1	123	122.9	06.0	183	182.8	09.0	243	242.7	11.9
4	04.0	00.2	64	63.9	03.1	124	123.9	06.1	184	183.8	09.0	244	243.7	12.0
5	05.0	00.2	65	64.9	03.2	125	124.9	06.1	185	184.8	09.1	245	244.7	12.0
6	06.0	00.3	66	65.9	03.2	126	125.8	06.2	186	185.8	09.1	246	245.7	12.1
7	07.0	00.3	67	66.9	03.3	127	126.8	06.2	187	186.8	09.2	247	246.7	12.1
8	08.0	00.4	68	67.9	03.3	128	127.8	06.3	188	187.8	09.2	248	247.7	12.2
9	09.0	00.4	69	68.9	03.4	129	128.8	06.3	189	188.8	09.3	249	248.7	12.2
10	10.0	00.5	70	69.9	03.4	130	129.8	06.4	190	189.8	09.3	250	249.7	12.3
11	11.0	00.5	71	70.9	03.5	131	130.8	06.4	191	190.8	09.4	251	250.7	12.3
12	12.0	00.6	72	71.9	03.5	132	131.8	06.5	192	191.8	09.4	252	251.7	12.4
13	13.0	00.6	73	72.9	03.6	133	132.8	06.5	193	192.8	09.5	253	252.7	12.4
14	14.0	00.7	74	73.9	03.6	134	133.8	06.6	194	193.8	09.5	254	253.7	12.5
15	15.0	00.7	75	74.9	03.7	135	134.8	06.6	195	194.8	09.6	255	254.7	12.5
16	16.0	00.8	76	75.9	03.7	136	135.8	06.7	196	195.8	09.6	256	255.7	12.6
17	17.0	00.8	77	76.9	03.8	137	136.8	06.7	197	196.8	09.7	257	256.7	12.6
18	18.0	00.9	78	77.9	03.8	138	137.8	06.8	198	197.8	09.7	258	257.7	12.7
19	19.0	00.9	79	78.9	03.9	139	138.8	06.8	199	198.8	09.8	259	258.7	12.7
20	20.0	01.0	80	79.9	03.9	140	139.8	06.9	200	199.8	09.8	260	259.7	12.8
21	21.0	01.0	81	80.9	04.0	141	140.8	06.9	201	200.8	09.9	261	260.7	12.8
22	22.0	01.1	82	81.9	04.0	142	141.8	07.0	202	201.8	09.9	262	261.7	12.9
23	23.0	01.1	83	82.9	04.1	143	142.8	07.0	203	202.8	10.0	263	262.7	12.9
24	24.0	01.2	84	83.9	04.1	144	143.8	07.1	204	203.8	10.0	264	263.7	13.0
25	25.0	01.2	85	84.9	04.2	145	144.8	07.1	205	204.8	10.1	265	264.7	13.0
26	26.0	01.3	86	85.9	04.2	146	145.8	07.2	206	205.8	10.1	266	265.7	13.1
27	27.0	01.3	87	86.9	04.3	147	146.8	07.2	207	206.8	10.2	267	266.7	13.1
28	28.0	01.4	88	87.9	04.3	148	147.8	07.3	208	207.8	10.2	268	267.7	13.2
29	29.0	01.4	89	88.9	04.4	149	148.8	07.3	209	208.8	10.3	269	268.7	13.2
30	30.0	01.5	90	89.9	04.4	150	149.8	07.4	210	209.8	10.3	270	269.7	13.3
31	31.0	01.5	91	90.9	04.5	151	150.8	07.4	211	210.7	10.4	271	270.7	13.3
32	32.0	01.6	92	91.9	04.5	152	151.8	07.5	212	211.7	10.4	272	271.7	13.3
33	33.0	01.6	93	92.9	04.6	153	152.8	07.5	213	212.7	10.5	273	272.7	13.4
34	34.0	01.7	94	93.9	04.6	154	153.8	07.6	214	213.7	10.5	274	273.7	13.4
35	35.0	01.7	95	94.9	04.7	155	154.8	07.6	215	214.7	10.6	275	274.7	13.5
36	36.0	01.8	96	95.9	04.7	156	155.8	07.7	216	215.7	10.6	276	275.7	13.5
37	37.0	01.8	97	96.9	04.8	157	156.8	07.7	217	216.7	10.7	277	276.7	13.6
38	38.0	01.9	98	97.9	04.8	158	157.8	07.8	218	217.7	10.7	278	277.7	13.6
39	39.0	01.9	99	98.9	04.9	159	158.8	07.8	219	218.7	10.8	279	278.7	13.7
40	40.0	02.0	100	99.9	04.9	160	159.8	07.9	220	219.7	10.8	280	279.7	13.7
41	41.0	02.0	101	100.9	05.0	161	160.8	07.9	221	220.7	10.8	281	280.7	13.8
42	41.9	02.1	102	101.9	05.0	162	161.8	08.0	222	221.7	10.9	282	281.7	13.8
43	42.9	02.1	103	102.9	05.1	163	162.8	08.0	223	222.7	10.9	283	282.7	13.9
44	43.9	02.2	104	103.9	05.1	164	163.8	08.1	224	223.7	11.0	284	283.7	13.9
45	44.9	02.2	105	104.9	05.2	165	164.8	08.1	225	224.7	11.0	285	284.7	14.0
46	45.9	02.3	106	105.9	05.2	166	165.8	08.2	226	225.7	11.1	286	285.7	14.0
47	46.9	02.3	107	106.9	05.3	167	166.8	08.2	227	226.7	11.1	287	286.7	14.1
48	47.9	02.4	108	107.9	05.3	168	167.8	08.2	228	227.7	11.2	288	287.7	14.1
49	48.9	02.4	109	108.9	05.4	169	168.8	08.3	229	228.7	11.2	289	288.7	14.2
50	49.9	02.5	110	109.9	05.4	170	169.8	08.3	230	229.7	11.3	290	289.7	14.2
51	50.9	02.5	111	110.9	05.5	171	170.8	08.4	231	230.7	11.3	291	290.7	14.3
52	51.9	02.6	112	111.9	05.5	172	171.8	08.4	232	231.7	11.4	292	291.7	14.3
53	52.9	02.6	113	112.9	05.5	173	172.8	08.5	233	232.7	11.4	293	292.7	14.4
54	53.9	02.7	114	113.9	05.6	174	173.8	08.5	234	233.7	11.5	294	293.6	14.4
55	54.9	02.7	115	114.9	05.6	175	174.8	08.6	235	234.7	11.5	295	294.6	14.5
56	55.9	02.8	116	115.9	05.7	176	175.8	08.6	236	235.7	11.6	296	295.6	14.5
57	56.9	02.8	117	116.9	05.7	177	176.8	08.7	237	236.7	11.6	297	296.6	14.6
58	57.9	02.9	118	117.9	05.8	178	177.8	08.7	238	237.7	11.7	298	297.6	14.6
59	58.9	02.9	119	118.9	05.8	179	178.8	08.8	239	238.7	11.7	299	298.6	14.7
60	59.9	02.9	120	119.9	05.9	180	179.8	08.8	240	239.7	11.8	300	299.6	14.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 7 ¾ Points.

TABLE I. Difference of Latitude and Departure for ½ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.7	06.0	121	120.4	11.9	181	180.1	17.7	241	239.8	23.6
2	02.0	00.2	62	61.7	06.1	122	121.4	12.0	182	181.1	17.8	242	240.8	23.7
3	03.0	00.3	63	62.7	06.2	123	122.4	12.1	183	182.1	17.9	243	241.8	23.8
4	04.0	00.4	64	63.7	06.3	124	123.4	12.2	184	183.1	18.0	244	242.8	23.9
5	05.0	00.5	65	64.7	06.4	125	124.4	12.3	185	184.1	18.1	245	243.8	24.0
6	06.0	00.6	66	65.7	06.5	126	125.4	12.3	186	185.1	18.2	246	244.8	24.1
7	07.0	00.7	67	66.7	06.6	127	126.4	12.4	187	186.1	18.3	247	245.8	24.2
8	08.0	00.8	68	67.7	06.7	128	127.4	12.5	188	187.1	18.4	248	246.8	24.3
9	09.0	00.9	69	68.7	06.8	129	128.4	12.6	189	188.1	18.5	249	247.8	24.4
10	10.0	01.0	70	69.7	06.9	130	129.4	12.7	190	189.1	18.6	250	248.8	24.5
11	10.9	01.1	71	70.7	07.0	131	130.4	12.8	191	190.1	18.7	251	249.8	24.6
12	11.9	01.2	72	71.7	07.1	132	131.4	12.9	192	191.1	18.8	252	250.8	24.7
13	12.9	01.3	73	72.6	07.2	133	132.4	13.0	193	192.1	18.9	253	251.8	24.8
14	13.9	01.4	74	73.6	07.3	134	133.4	13.1	194	193.1	19.0	254	252.8	24.9
15	14.9	01.5	75	74.6	07.4	135	134.3	13.2	195	194.1	19.1	255	253.8	25.0
16	15.9	01.6	76	75.6	07.4	136	135.3	13.4	196	195.1	19.2	256	254.8	25.1
17	16.9	01.7	77	76.6	07.5	137	136.3	13.4	197	196.1	19.3	257	255.8	25.2
18	17.9	01.8	78	77.6	07.6	138	137.3	13.5	198	197.0	19.4	258	256.8	25.3
19	18.9	01.9	79	78.6	07.7	139	138.3	13.6	199	198.0	19.5	259	257.8	25.4
20	19.9	02.0	80	79.6	07.8	140	139.3	13.7	200	199.0	19.6	260	258.7	25.5
21	20.9	02.1	81	80.6	07.9	141	140.3	13.8	201	200.0	19.7	261	259.7	25.6
22	21.9	02.2	82	81.6	08.0	142	141.3	13.9	202	201.0	19.8	262	260.7	25.7
23	22.9	02.3	83	82.6	08.1	143	142.3	14.0	203	202.0	19.9	263	261.7	25.8
24	23.9	02.4	84	83.6	08.2	144	143.3	14.1	204	203.0	20.0	264	262.7	25.9
25	24.9	02.4	85	84.6	08.3	145	144.3	14.2	205	204.0	20.1	265	263.7	26.0
26	25.9	02.5	86	85.6	08.4	146	145.3	14.3	206	205.0	20.2	266	264.7	26.1
27	26.9	02.6	87	86.6	08.5	147	146.3	14.4	207	206.0	20.3	267	265.7	26.2
28	27.9	02.7	88	87.6	08.6	148	147.3	14.5	208	207.0	20.4	268	266.7	26.3
29	28.9	02.8	89	88.6	08.7	149	148.3	14.6	209	208.0	20.5	269	267.7	26.4
30	29.9	02.9	90	89.6	08.8	150	149.3	14.7	210	209.0	20.6	270	268.7	26.5
31	30.9	03.0	91	90.6	08.9	151	150.3	14.8	211	210.0	20.7	271	269.7	26.6
32	31.8	03.1	92	91.6	09.0	152	151.3	14.9	212	211.0	20.8	272	270.7	26.7
33	32.8	03.2	93	92.6	09.1	153	152.3	15.0	213	212.0	20.9	273	271.7	26.8
34	33.8	03.3	94	93.5	09.2	154	153.3	15.1	214	213.0	21.0	274	272.7	26.9
35	34.8	03.4	95	94.5	09.3	155	154.3	15.2	215	214.0	21.1	275	273.7	27.0
36	35.8	03.5	96	95.5	09.4	156	155.2	15.3	216	215.0	21.2	276	274.7	27.1
37	36.8	03.6	97	96.5	09.5	157	156.2	15.4	217	216.0	21.3	277	275.7	27.2
38	37.8	03.7	98	97.5	09.6	158	157.2	15.5	218	216.9	21.4	278	276.7	27.3
39	38.8	03.8	99	98.5	09.7	159	158.2	15.6	219	217.9	21.5	279	277.7	27.3
40	39.8	03.9	100	99.5	09.8	160	159.2	15.7	220	218.9	21.6	280	278.7	27.4
41	40.8	04.0	101	100.5	09.9	161	160.2	15.8	221	219.9	21.7	281	279.6	27.5
42	41.8	04.1	102	101.5	10.0	162	161.2	15.9	222	220.9	21.8	282	280.6	27.6
43	42.8	04.2	103	102.5	10.1	163	162.2	16.0	223	221.9	21.9	283	281.6	27.7
44	43.8	04.3	104	103.5	10.2	164	163.2	16.1	224	222.9	22.0	284	282.6	27.8
45	44.8	04.4	105	104.5	10.3	165	164.2	16.2	225	223.9	22.1	285	283.6	27.9
46	45.8	04.5	106	105.5	10.4	166	165.2	16.3	226	224.9	22.2	286	284.6	28.0
47	46.8	04.6	107	106.5	10.5	167	166.2	16.4	227	225.9	22.2	287	285.6	28.1
48	47.8	04.7	108	107.5	10.6	168	167.2	16.5	228	226.9	22.3	288	286.6	28.2
49	48.8	04.8	109	108.5	10.7	169	168.2	16.6	229	227.9	22.4	289	287.6	28.3
50	49.8	04.9	110	109.5	10.8	170	169.2	16.7	230	228.9	22.5	290	288.6	28.4
51	50.8	05.0	111	110.5	10.9	171	170.2	16.8	231	229.9	22.6	291	289.6	28.5
52	51.7	05.1	112	111.5	11.0	172	171.2	16.9	232	230.9	22.7	292	290.6	28.6
53	52.7	05.2	113	112.5	11.1	173	172.2	17.0	233	231.9	22.8	293	291.6	28.7
54	53.7	05.3	114	113.5	11.2	174	173.2	17.1	234	232.9	22.9	294	292.6	28·8
55	54.7	05.4	115	114.4	11.3	175	174.2	17.2	235	233.9	23.0	295	293.6	28.9
56	55.7	05.5	116	115.4	11.4	176	175.2	17.3	236	234.9	23.1	296	294.6	29.0
57	56.7	05.6	117	116.4	11.5	177	176.1	17.4	237	235.9	23.2	297	295.6	29.1
58	57.7	05.7	118	117.4	11.6	178	177.1	17.4	238	236.9	23.3	298	296.6	29.2
59	58.7	05.8	119	118.4	11.7	179	178.1	17.5	239	237.8	23.4	299	297.6	29.3
60	59.7	05.9	120	119.4	11.8	180	179.1	17.6	240	238.8	23.5	300	298.6	29.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat	Dist	Dep	Lat.	Dist	Dep	Lat.

For 7½ Points.

TABLE I. Difference of Latitude and Departure for ¾ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.3	08.9	121	119.7	17.7	181	179.0	26.6	241	238.4	35.4
2	02.0	00.3	62	61.3	09.1	122	120.7	17.9	182	180.0	26.7	242	239.4	35.5
3	03.0	00.4	63	62.3	09.2	123	121.7	18.0	183	181.0	26.8	243	240.4	35.7
4	04.0	00.6	64	63.3	09.4	124	122.7	18.2	184	182.0	27.0	244	241.4	35.8
5	04.9	00.7	65	64.3	09.5	125	123.6	18.3	185	183.0	27.1	245	242.3	35.9
6	05.9	00.9	66	65.3	09.7	126	124.6	18.5	186	184.0	27.3	246	243.3	36.1
7	06.9	01.0	67	66.3	09.8	127	125.6	18.6	187	185.0	27.4	247	244.3	36.2
8	07.9	01.2	68	67.3	10.0	128	126.6	18.8	188	186.0	27.6	248	245.3	36.4
9	08.9	01.3	69	68.2	10.1	129	127.6	18.9	189	186.9	27.7	249	246.3	36.5
10	09.9	01.5	70	69.2	10.3	130	128.6	19.1	190	187.9	27.9	250	247.3	36.7
11	10.9	01.6	71	70.2	10.4	131	129.6	19.2	191	188.9	28.0	251	248.3	36.8
12	11.9	01.8	72	71.2	10.6	132	130.6	19.4	192	189.9	28.2	252	249.3	37.0
13	12.9	01.9	73	72.2	10.7	133	131.6	19.5	193	190.9	28.3	253	250.3	37.1
14	13.8	02.1	74	73.2	10.9	134	132.5	19.7	194	191.9	28.5	254	251.2	37.3
15	14.8	02.2	75	74.2	11.0	135	133.5	19.8	195	192.9	28.6	255	252.2	37.4
16	15.8	02.3	76	75.2	11.1	136	134.5	20.0	196	193.9	28.8	356	253.2	37.6
17	16.8	02.5	77	76.2	11.3	137	135.5	20.1	197	194.9	28.9	257	254.2	37.7
18	17.8	02.6	78	77.2	11.4	138	136.5	20.2	198	195.9	29.0	258	255.2	37.9
19	18.8	02.8	79	78.1	11.6	139	137.5	20.4	199	196.8	29.2	259	256.2	38.0
20	19.8	02.9	80	79.1	11.7	140	138.5	20.5	200	197.8	29.3	260	257.2	38.1
21	20.8	03.1	81	80.1	11.9	141	139.5	20.7	201	198.8	29.5	261	258.2	38.3
22	21.8	03.2	82	81.1	12.0	142	140.5	20.8	202	199.8	29.6	262	259.2	38.4
23	22.7	03.4	83	82.1	12.2	143	141.4	21.0	203	200.8	29.8	263	260.1	38.6
24	23.7	03.5	84	83.1	12.3	144	142.4	21.1	204	201.8	29.9	264	261.1	38.7
25	24.7	03.7	85	84.1	12.5	145	143.4	21.3	205	202.8	30.1	265	262.1	38.9
26	25.7	03.8	86	85.1	12.6	146	144.4	21.4	206	203.8	30.2	266	263.1	39.0
27	26.7	04.0	87	86.1	12.8	147	145.4	21.6	207	204.8	30.4	267	264.1	39.2
28	27.7	04.1	88	87.0	12.9	148	146.4	21.7	208	205.7	30.5	268	265.1	39.3
29	28.7	04.3	89	88.0	13.1	149	147.4	21.9	209	206.7	30.7	269	266.1	39.5
30	29.7	04.4	90	89.0	13.2	150	148.4	22.0	210	207.7	30.8	270	267.1	39.6
31	30.7	04.5	91	90.0	13.3	151	149.4	22.2	211	208.7	30.9	271	268.1	39.8
32	31.7	04.7	92	91.0	13.5	152	150.3	22.3	212	209.7	31.1	272	269.0	39.9
33	32.6	04.8	93	92.0	13.6	153	151.3	22.4	213	210.7	31.2	273	270.0	40.1
34	33.6	05.0	94	93.0	13.8	154	152.3	22.6	214	211.7	31.4	274	271.0	40.2
35	34.6	05.1	95	94.0	13.9	155	153.3	22.7	215	212.7	31.5	275	272.0	40.3
36	35.6	05.3	96	95.0	14.1	156	154.3	22.9	216	213.7	31.7	276	273.0	40.5
37	36.6	05.4	97	95.9	14.2	157	155.3	23.0	217	214.6	31.8	277	274.0	40.6
38	37.6	05.6	98	96.9	14.4	158	156.3	23.2	218	215.6	32.0	278	275.0	40.8
39	38.6	05.7	99	97.9	14.5	159	157.3	23.3	219	216.6	32.1	279	276.0	40.9
40	39.6	05.9	100	98.9	14.7	160	158.3	23.5	220	217.6	32.3	280	277.0	41.1
41	40.6	06.0	101	99.9	14.8	161	159.3	23.6	221	218.6	32.4	281	278.0	41.2
42	41.5	06.2	102	100.9	15.0	162	160.2	23.8	222	219.6	32.6	282	278.9	41.4
43	42.5	06.3	103	101.9	15.1	163	161.2	23.9	223	220.6	32.7	283	279.9	41.5
44	43.5	06.5	104	102.9	15.3	164	162.2	24.1	224	221.6	32.9	284	280.9	41.7
45	44.5	06.6	105	103.9	15.4	165	163.2	24.2	225	222.6	33.0	285	281.9	41.8
46	45.5	06.7	106	104.8	15.5	166	164.2	24.4	226	223.5	33.2	286	282.9	42.0
47	46.5	06.9	107	105.8	15.7	167	165.2	24.5	227	224.5	33.3	287	283.9	42.1
48	47.5	07.0	108	106.8	15.8	168	166.2	24.6	228	225.5	33.4	288	284.9	42.3
49	48.5	07.2	109	107.8	16.0	169	167.2	24.8	229	226.5	33.6	289	285.9	42.4
50	49.5	07.3	110	108.8	16.1	170	168.2	24.9	230	227.5	33.7	290	286.9	42.5
51	50.4	07.5	111	109.8	16.3	171	169.1	25.1	231	228.5	33.9	291	287.8	42.7
52	51.4	07.6	112	110.8	16.4	172	170.1	25.2	232	229.5	34.0	292	288.8	42.8
53	52.4	07.8	113	111.8	16.6	173	171.1	25.4	233	230.5	34.2	293	289.8	43.0
54	53.4	07.9	114	112.8	16.7	174	172.1	25.5	234	231.5	34.3	294	290.8	43.1
55	54.4	08.1	115	113.7	16.9	175	173.1	25.7	235	232.4	34.5	295	291.8	43.3
56	55.4	08.2	116	114.7	17.0	176	174.1	25.8	236	233.4	34.6	296	292.8	43.4
57	56.4	08.4	117	115.7	17.2	177	175.1	26.0	237	234.4	34.8	297	293.8	43.6
58	57.4	08.5	118	116.7	17.3	178	176.1	26.1	238	235.4	34.9	298	294.8	43.7
59	58.4	08.7	119	117.7	17.5	179	177.1	26.3	239	236.4	35.1	299	295.8	43.9
60	59.3	08.8	120	118.7	17.6	180	178.0	26.4	240	237.4	35.2	300	296.8	44.0
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 7¼ Points.

TABLE I. Difference of Latitude and Departure for 1 Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.8	11.9	121	118.7	23.6	181	177.5	35.3	241	236.4	47.0
2	02.0	00.4	62	60.8	12.1	122	119.7	23.8	182	178.5	35.5	242	237.3	47.2
3	02.9	00.6	63	61.8	12.3	123	120.6	24.0	183	179.5	35.7	243	238.3	47.4
4	03.9	00.8	64	62.8	12.5	124	121.6	24.2	184	180.5	35.9	244	239.3	47.6
5	04.9	01.0	65	63.7	12.7	125	122.6	24.4	185	181.4	36.1	245	240.3	47.8
6	05.9	01.2	66	64.7	12.9	126	123.6	24.6	186	182.4	36.3	246	241.3	48.0
7	06.9	01.4	67	65.7	13.1	127	124.6	24.8	187	183.4	36.5	247	242.3	48.2
8	07.8	01.6	68	66.7	13.3	128	125.5	25.0	188	184.4	36.7	248	243.2	48.4
9	08.8	01.8	69	67.7	13.5	129	126.5	25.2	189	185.4	36.9	249	244.2	48.6
10	09.8	02.0	70	68.7	13.7	130	127.5	25.4	190	186.3	37.1	250	245.2	48.8
11	10.8	02.1	71	69.6	13.9	131	128.5	25.6	191	187.3	37.3	251	246.2	49.0
12	11.8	02.3	72	70.6	14.0	132	129.5	25.8	192	188.3	37.5	252	247.2	49.2
13	12.7	02.5	73	71.6	14.2	133	130.4	26.0	193	189.3	37.7	253	248.1	49.4
14	13.7	02.7	74	72.6	14.4	134	131.4	26.1	194	190.3	37.8	254	249.1	49.6
15	14.7	02.9	75	73.6	14.6	135	132.4	26.3	195	191.2	38.0	255	250.1	49.7
16	15.7	03.1	76	74.5	14.8	136	133.4	26.5	196	192.2	38.2	256	251.1	49.9
17	16.7	03.3	77	75.5	15.0	137	134.4	26.7	197	193.2	38.4	257	252.1	50.1
18	17.7	03.5	78	76.5	15.2	138	135.3	26.9	198	194.2	38.6	258	253.0	50.3
19	18.6	03.7	79	77.5	15.4	139	136.3	27.1	199	195.2	38.8	259	254.0	50.5
20	19.6	03.9	80	78.5	15.6	140	137.3	27.3	200	196.2	39.0	260	255.0	50.7
21	20.6	04.1	81	79.4	15.8	141	138.3	27.5	201	197.1	39.2	261	256.0	50.9
22	21.6	04.3	82	80.4	16.0	142	139.3	27.7	202	198.1	39.4	262	257.0	51.1
23	22.6	04.5	83	81.4	16.2	143	140.2	27.9	203	199.1	39.6	263	257.9	51.3
24	23.5	04.7	84	82.4	16.4	144	141.2	28.1	204	200.1	39.8	264	258.9	51.5
25	24.5	04.9	85	83.4	16.6	145	142.2	28.3	205	201.1	40.0	265	259.9	51.7
26	25.5	05.1	86	84.3	16.8	146	143.2	28.5	206	202.0	40.2	266	260.9	51.9
27	26.5	05.3	87	85.3	17.0	147	144.2	28.7	207	203.0	40.4	267	261.9	52.1
28	27.5	05.5	88	86.3	17.2	148	145.2	28.9	208	204.0	40.6	268	262.8	52.3
29	28.4	05.7	89	87.3	17.4	149	146.1	29.1	209	205.0	40.8	269	263.8	52.5
30	29.4	05.9	90	88.3	17.6	150	147.1	29.3	210	206.0	41.0	270	264.8	52.7
31	30.4	06.0	91	89.2	17.8	151	148.1	29.5	211	206.9	41.2	271	265.8	52.9
32	31.4	06.2	92	90.2	18.0	152	149.1	29.7	212	207.9	41.4	272	266.8	53.1
33	32.4	06.4	93	91.2	18.1	153	150.1	29.9	213	208.9	41.6	273	267.8	53.3
34	33.3	06.6	94	92.2	18.3	154	151.0	30.0	214	209.9	41.7	274	268.7	53.5
35	34.3	06.8	95	93.2	18.5	155	152.0	30.2	215	210.9	41.9	275	269.7	53.6
36	35.3	07.0	96	94.2	18.7	156	153.0	30.4	216	211.8	42.1	276	270.7	53.8
37	36.3	07.2	97	95.1	18.9	157	154.0	30.6	217	212.8	42.3	277	271.7	54.0
38	37.3	07.4	98	96.1	19.1	158	155.0	30.8	218	213.8	42.5	278	272.7	54.2
39	38.2	07.6	99	97.1	19.3	159	155.9	31.0	219	214.8	42.7	279	273.6	54.4
40	39.2	07.8	100	98.1	19.5	160	156.9	31.2	220	215.8	42.9	280	274.6	54.6
41	40.2	08.0	101	99.1	19.7	161	157.9	31.4	221	216.7	43.1	281	275.6	54.8
42	41.2	08.2	102	100.0	19.9	162	158.9	31.6	222	217.7	43.3	282	276.6	55.0
43	42.2	08.4	103	101.0	20.1	163	159.9	31.8	223	218.7	43.5	283	277.6	55.2
44	43.2	08.6	104	102.0	20.3	164	160.8	32.0	224	219.7	43.7	284	278.5	55.4
45	44.1	08.8	105	103.0	20.5	165	161.8	32.2	225	220.7	43.9	285	279.5	55.6
46	45.1	09.0	106	104.0	20.7	166	162.8	32.4	226	221.7	44.1	286	280.5	55.8
47	46.1	09.2	107	104.9	20.9	167	163.8	32.6	227	222.6	44.3	287	281.5	56.0
48	47.1	09.4	108	105.9	21.1	168	164.8	32.8	228	223.6	44.5	288	282.5	56.2
49	48.1	09.6	109	106.9	21.3	169	165.7	33.0	229	224.6	44.7	289	283.4	56.4
50	49.0	09.8	110	107.9	21.5	170	166.7	33.2	230	225.6	44.9	290	284.4	56.6
51	50.0	09.9	111	108.9	21.7	171	167.7	33.4	231	226.6	45.1	291	285.4	56.8
52	51.0	10.1	112	109.8	21.9	172	168.7	33.6	232	227.5	45.3	292	286.4	57.0
53	52.0	10.3	113	110.8	22.0	173	169.7	33.8	233	228.5	45.5	293	287.4	57.2
54	53.0	10.5	114	111.8	22.2	174	170.7	33.9	234	229.5	45.7	294	288.3	57.4
55	53.9	10.7	115	112.8	22.4	175	171.6	34.1	235	230.5	45.8	295	289.3	57.6
56	54.9	10.9	116	113.8	22.6	176	172.6	34.3	236	231.5	46.0	296	290.3	57.7
57	55.9	11.1	117	114.7	22.8	177	173.6	34.5	237	232.4	46.2	297	291.3	57.9
58	56.9	11.3	118	115.7	23.0	178	174.6	34.7	238	233.4	46.4	298	292.3	58.1
59	57.9	11.5	119	116.7	23.2	179	175.6	34.9	239	234.4	46.6	299	293.3	58.3
60	58.8	11.7	120	117.7	23.4	180	176.5	35.1	240	235.4	46.8	300	294.2	58.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 7 Points

TABLE I. Difference of Latitude and Departure for 1¼ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.2	14.8	121	117.4	29.4	181	175.6	44.0	241	233.8	58.6
2	01.9	00.5	62	60.1	15.1	122	118.3	29.6	182	176.5	44.2	242	234.7	58.8
3	02.9	00.7	63	61.1	15.3	123	119.3	29.9	183	177.5	44.5	243	235.7	59.0
4	03.9	01.0	64	62.1	15.6	124	120.3	30.1	184	178.5	44.7	244	236.7	59.3
5	04.9	01.2	65	63.1	15.8	125	121.3	30.4	185	179.5	45.0	245	237.7	59.5
6	05.8	01.5	66	64.0	16.0	126	122.2	30.6	186	180.4	45.2	246	238.6	59.8
7	06.8	01.7	67	65.0	16.3	127	123.2	30.9	187	181.4	45.4	247	239.6	60.0
8	07.8	01.9	68	66.0	16.5	128	124.2	31.1	188	182.4	45.7	248	240.6	60.3
9	08.7	02.2	69	66.9	16.8	129	125.1	31.3	189	183.3	45.9	249	241.5	60.5
10	09.7	02.4	70	67.9	17.0	130	126.1	31.6	190	184.3	46.2	250	242.5	60.7
11	10.7	02.7	71	68.9	17.3	131	127.1	31.8	191	185.3	46.4	251	243.5	61.0
12	11.6	02.9	72	69.8	17.5	132	128.0	32.1	192	186.2	46.7	252	244.5	61.2
13	12.6	03.2	73	70.8	17.7	133	129.0	32.3	193	187.2	46.9	253	245.4	61.5
14	13.6	03.4	74	71.8	18.0	134	130.0	32.6	194	188.2	47.1	254	246.4	61.7
15	14.6	03.6	75	72.8	18.2	135	131.0	32.8	195	189.2	47.4	255	247.4	62.0
16	15.5	03.9	76	73.7	18.5	136	131.9	33.0	196	190.1	47.6	256	248.3	62.2
17	16.5	04.1	77	74.7	18.7	137	132.9	33.3	197	191.1	47.9	257	249.3	62.5
18	17.5	04.4	78	75.7	19.0	138	133.9	33.5	198	192.1	48.1	258	250.3	62.7
19	18.4	04.6	79	76.6	19.2	139	134.8	33.8	199	193.0	48.4	259	251.2	62.9
20	19.4	04.9	80	77.6	19.4	140	135.8	34.0	200	194.0	48.6	260	252.2	63.2
21	20.4	05.1	81	78.6	19.7	141	136.8	34.3	201	195.0	48.8	261	253.2	63.4
22	21.3	05.3	82	79.5	19.9	142	137.7	34.5	202	195.9	49.1	262	254.2	63.7
23	22.3	05.6	83	80.5	20.2	143	138.7	34.7	203	196.9	49.3	263	255.1	63.9
24	23.3	05.8	84	81.5	20.4	144	139.7	35.0	204	197.9	49.6	264	256.1	64.2
25	24.3	06.1	85	82.5	20.7	145	140.7	35.2	205	198.9	49.8	265	257.1	64.4
26	25.2	06.3	86	83.4	20.9	146	141.6	35.5	206	199.8	50.1	266	258.0	64.6
27	26.2	06.6	87	84.4	21.1	147	142.6	35.7	207	200.8	50.3	267	259.0	64.9
28	27.2	06.8	88	85.4	21.4	148	143.6	36.0	208	201.8	50.5	268	260.0	65.1
29	28.1	07.0	89	86.3	21.6	149	144.5	36.2	209	202.7	50.8	269	260.9	65.4
30	29.1	07.3	90	87.3	21.9	150	145.5	36.5	210	203.7	51.0	270	261.9	65.6
31	30.1	07.5	91	88.3	22.1	151	146.5	36.7	211	204.7	51.3	271	262.9	65.9
32	31.0	07.8	92	89.2	22.4	152	147.4	36.9	212	205.6	51.5	272	263.9	66.1
33	32.0	08.0	93	90.2	22.6	153	148.4	37.2	213	206.6	51.8	273	264.8	66.3
34	33.0	08.3	94	91.2	22.8	154	149.4	37.4	214	207.6	52.0	274	265.8	66.6
35	34.0	08.5	95	92.2	23.1	155	150.4	37.7	215	208.6	52.2	275	266.8	66.8
36	34.9	08.7	96	93.1	23.3	156	151.3	37.9	216	209.5	52.5	276	267.7	67.1
37	35.9	09.0	97	94.1	23.6	157	152.3	38.2	217	210.5	52.7	277	268.7	67.3
38	36.9	09.2	98	95.1	23.8	158	153.3	38.4	218	211.5	53.0	278	269.7	67.6
39	37.8	09.5	99	96.0	24.1	159	154.2	38.6	219	212.4	53.2	279	270.6	67.8
40	38.8	09.7	100	97.0	24.3	160	155.2	38.9	220	213.4	53.5	280	271.6	68.0
41	39.8	10.0	101	98.0	24.5	161	156.2	39.1	221	214.4	53.7	281	272.6	68.3
42	40.7	10.2	102	98.9	24.8	162	157.1	39.4	222	215.4	53.9	282	273.6	68.5
43	41.7	10.4	103	99.9	25.0	163	158.1	39.6	223	216.3	54.2	283	274.5	68.8
44	42.7	10.7	104	100.9	25.3	164	159.1	39.9	224	217.3	54.4	284	275.5	69.0
45	43.7	10.9	105	101.9	25.5	165	160.1	40.1	225	218.3	54.7	285	276.5	69.3
46	44.6	11.2	106	102.8	25.8	166	161.0	40.3	226	219.2	54.9	286	277.4	69.5
47	45.6	11.4	107	103.8	26.0	167	162.0	40.6	227	220.2	55.2	287	278.4	69.7
48	46.6	11.7	108	104.8	26.2	168	163.0	40.8	228	221.2	55.4	288	279.4	70.0
49	47.5	11.9	109	105.7	26.5	169	163.9	41.1	229	222.1	55.6	289	280.3	70.2
50	48.5	12.2	110	106.7	26.7	170	164.9	41.3	230	223.1	55.9	290	281.3	70.5
51	49.5	12.4	111	107.7	27.0	171	165.9	41.6	231	224.1	56.1	291	282.3	70.7
52	50.4	12.6	112	108.6	27.2	172	166.8	41.8	232	225.1	56.4	292	283.3	71.0
53	51.4	12.9	113	109.6	27.5	173	167.8	42.0	233	226.0	56.6	293	284.2	71.2
54	52.4	13.1	114	110.6	27.7	174	168.8	42.3	234	227.0	56.9	294	285.2	71.4
55	53.4	13.4	115	111.6	27.9	175	169.8	42.5	235	228.0	57.1	295	236.2	71.7
56	54.3	13.6	116	112.5	28.2	176	170.7	42.8	236	228.9	57.3	296	287.1	71.9
57	55.3	13.9	117	113.5	28.4	177	171.7	43.0	237	229.9	57.6	297	288.1	72.2
58	56.3	14.1	118	114.5	28.7	178	172.7	43.3	238	230.9	57.8	298	289.1	72.4
59	57.2	14.3	119	115.4	28.9	179	173.6	43.5	239	231.8	58.1	299	290.0	72.7
60	58.2	14.6	120	116.4	29.2	180	174.6	43.7	240	232.8	58.3	300	291.0	72.9
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 6¾ Points.

TABLE I. Difference of Latitude and Departure for 1½ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.3	61	58.4	17.7	121	115.8	35.1	181	173.2	52.5	241	230.6	70.0
2	01.9	00.6	62	59.3	18.0	122	116.8	35.4	182	174.2	52.8	242	231.6	70.2
3	02.9	00.9	63	60.3	18.3	123	117.7	35.7	183	175.1	53.1	243	232.5	70.5
4	03.8	01.2	64	61.2	18.6	124	118.7	36.0	184	176.1	53.4	244	233.5	70.8
5	04.8	01.5	65	62.2	18.9	125	119.6	36.3	185	177.0	53.7	245	234.5	71.1
6	05.7	01.7	66	63.2	19.2	126	120.6	36.6	186	178.0	54.0	246	235.4	71.4
7	06.7	02.0	67	64.1	19.4	127	121.5	36.9	187	179.0	54.3	247	236.4	71.7
8	07.7	02.3	68	65.1	19.7	128	122.5	37.2	188	179.9	54.6	248	237.3	72.0
9	08.6	02.6	69	66.0	20.0	129	123.5	37.4	189	180.9	54.9	249	238.3	72.3
10	09.6	02.9	70	67.0	20.3	130	124.4	37.7	190	181.8	55.1	250	239.2	72.6
11	10.5	03.2	71	67.9	20.6	131	125.4	38.0	191	182.8	55.4	251	240.2	72.9
12	11.5	03.5	72	68.9	20.9	132	126.3	38.3	192	183.7	55.7	252	241.2	73.2
13	12.4	03.8	73	69.9	21.2	133	127.3	38.6	193	184.7	56.0	253	242.1	73.4
14	13.4	04.1	74	70.8	21.5	134	128.2	38.9	194	185.7	56.3	254	243.1	73.7
15	14.4	04.4	75	71.8	21.8	135	129.2	39.2	195	186.6	56.6	255	244.0	74.0
16	15.3	04.6	76	72.7	22.1	136	130.1	39.5	196	187.6	56.9	256	245.0	74.3
17	16.3	04.9	77	73.7	22.3	137	131.1	39.8	197	188.5	57.2	257	245.9	74.6
18	17.2	05.2	78	74.6	22.6	138	132.1	40.1	198	189.5	57.5	258	246.9	74.9
19	18.2	05.5	79	75.6	22.9	139	133.0	40.3	199	190.4	57.8	259	247.9	75.2
20	19.1	05.8	80	76.6	23.2	140	134.0	40.6	200	191.4	58.1	260	248.8	75.5
21	20.1	06.1	81	77.5	23.5	141	134.9	40.9	201	192.3	58.4	261	249.8	75.8
22	21.1	06.4	82	78.5	23.8	142	135.9	41.2	202	193.3	58.6	262	250.7	76.0
23	22.0	06.7	83	79.4	24.1	143	136.8	41.5	203	194.3	58.9	263	251.7	76.3
24	23.0	07.0	84	80.4	24.4	144	137.8	41.8	204	195.2	59.2	264	252.6	76.6
25	23.9	07.3	85	81.3	24.7	145	138.8	42.1	205	196.2	59.5	265	253.6	76.9
26	24.9	07.5	86	82.3	25.0	146	139.7	42.4	206	197.1	59.8	266	254.6	77.2
27	25.8	07.8	87	83.3	25.2	147	140.7	42.7	207	198.1	60.1	267	255.5	77.5
28	26.8	08.1	88	84.2	25.5	148	141.6	43.0	208	199.0	60.4	268	256.5	77.8
29	27.8	08.4	89	85.2	25.8	149	142.6	43.2	209	200.0	60.7	269	257.4	78.1
30	28.7	08.7	90	86.1	26.1	150	143.5	43.5	210	201.0	61.0	270	258.4	78.4
31	29.7	09.0	91	87.1	26.4	151	144.5	43.8	211	201.9	61.2	271	259.3	78.7
32	30.6	09.3	92	88.0	26.7	152	145.5	44.1	212	202.9	61.5	272	260.3	79.0
33	31.6	09.6	93	89.0	27.0	153	146.4	44.4	213	203.8	61.8	273	261.2	79.2
34	32.5	09.9	94	90.0	27.3	154	147.4	44.7	214	204.8	62.1	274	262.2	79.5
35	33.5	10.2	95	90.9	27.6	155	148.3	45.0	215	205.7	62.4	275	263.2	79.8
36	34.5	10.4	96	91.9	27.8	156	149.3	45.3	216	206.7	62.7	276	264.1	80.1
37	35.4	10.7	97	92.8	28.2	157	150.2	45.6	217	207.7	63.0	277	265.1	80.4
38	36.4	11.0	98	93.8	28.4	158	151.2	45.9	218	208.6	63.3	278	266.0	80.7
39	37.3	11.3	99	94.7	28.7	159	152.2	46.1	219	209.6	63.6	279	267.0	81.0
40	38.3	11.6	100	95.7	29.0	160	153.1	46.4	220	210.5	63.9	280	267.9	81.3
41	39.2	11.9	101	96.7	29.3	161	154.1	46.7	221	211.5	64.1	281	268.9	81.6
42	40.2	12.2	102	97.6	29.6	162	155.0	47.0	222	212.4	64.4	282	269.9	81.9
43	41.2	12.5	103	98.6	29.9	163	156.0	47.3	223	213.4	64.7	283	270.8	82.2
44	42.1	12.8	104	99.5	30.2	164	156.9	47.6	224	214.4	65.0	284	271.8	82.4
45	43.1	13.1	105	100.5	30.5	165	157.9	47.9	225	215.3	65.3	285	272.7	82.7
46	44.0	13.3	106	101.4	30.8	166	158.9	48.2	226	216.3	65.6	286	273.7	83.0
47	45.0	13.6	107	102.4	31.1	167	159.8	48.5	227	217.2	65.9	287	274.6	83.3
48	45.9	13.9	108	103.4	31.4	168	160.8	48.8	228	218.2	66.2	288	275.6	83.6
49	46.9	14.2	109	104.3	31.6	169	161.7	49.1	229	219.1	66.5	289	276.6	83.9
50	47.9	14.5	110	105.3	31.9	170	162.7	49.3	230	220.1	66.8	290	277.5	84.2
51	48.8	14.8	111	106.2	32.2	171	163.6	49.6	231	221.1	67.0	291	278.5	84.5
52	49.8	15.1	112	107.2	32.5	172	164.6	49.9	232	222.0	67.3	292	279.4	84.8
53	50.7	15.4	113	108.1	32.8	173	165.6	50.2	233	223.0	67.6	293	280.4	85.0
54	51.7	15.7	114	109.1	33.1	174	166.5	50.5	234	223.9	67.9	294	281.3	85.3
55	52.6	16.0	115	110.1	33.4	175	167.5	50.8	235	224.9	68.2	295	282.3	85.6
56	53.6	16.3	116	111.0	33.7	176	168.4	51.1	236	225.8	68.5	296	283.3	85.9
57	54.5	16.5	117	112.0	34.0	177	169.4	51.4	237	226.8	68.8	297	284.2	86.2
58	55.5	16.8	118	112.9	34.2	178	170.3	51.7	238	227.8	69.1	298	285.2	86.5
59	56.5	17.1	119	113.9	34.5	179	171.3	52.0	239	228.7	69.4	299	286.1	86.8
60	57.4	17.4	120	114.8	34.8	180	172.3	52.2	240	229.7	69.7	300	287.1	87.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 6½ Points.

TABLE I. Difference of Latitude and Departure for 1¾ Point.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.3	61	57.4	20.5	121	113.9	40.8	181	170.4	61.0	241	226.9	81.2
2	01.9	00.7	62	58.4	20.9	122	114.9	41.1	182	171.4	61.3	242	227.8	81.5
3	02.8	01.0	63	59.3	21.2	123	115.8	41.4	183	172.3	61.6	243	228.8	81.9
4	03.8	01.3	64	60.3	21.6	124	116.7	41.8	184	173.2	62.0	244	229.7	82.2
5	04.7	01.7	65	61.2	21.9	125	117.7	42.1	185	174.2	62.3	245	230.7	82.5
6	05.6	02.0	66	62.1	22.2	126	118.6	42.4	186	175.1	62.7	246	231.6	82.9
7	06.6	02.4	67	63.1	22.6	127	119.6	42.8	187	176.1	63.0	247	232.6	83.2
8	07.5	02.7	68	64.0	22.9	128	120.5	43.1	188	177.0	63.3	248	233.5	83.5
9	08.5	03.0	69	65.0	23.2	129	121.5	43.5	189	177.9	63.7	249	234.4	83.9
10	09.4	03.4	70	65.9	23.6	130	122.4	43.8	190	178.9	64.0	250	235.4	84.2
11	10.4	03.7	71	66.8	23.9	131	123.3	44.1	191	179.8	64.3	251	236.3	84.6
12	11.3	04.0	72	67.8	24.3	132	124.3	44.5	192	180.8	64.7	252	237.3	84.9
13	12.2	04.4	73	68.7	24.6	133	125.2	44.8	193	181.7	65.0	253	238.2	85.2
14	13.2	04.7	74	69.7	24.9	134	126.2	45.1	194	182.7	65.4	254	239.1	85.6
15	14.1	05.1	75	70.6	25.3	135	127.1	45.5	195	183.6	65.7	255	240.1	85.9
16	15.1	05.4	76	71.6	25.6	136	128.0	45.8	196	184.5	66.0	256	241.0	86.2
17	16.0	05.7	77	72.5	25.9	137	129.0	46.2	197	185.5	66.4	257	242.0	86.6
18	17.0	06.1	78	73.4	26.3	138	129.9	46.5	198	186.4	66.7	258	242.9	86.9
19	17.9	06.4	79	74.4	26.6	139	130.9	46.8	199	187.4	67.0	259	243.9	87.2
20	18.8	06.7	80	75.3	27.0	140	131.8	47.2	200	188.3	67.4	260	244.8	87.6
21	19.8	07.1	81	76.3	27.3	141	132.8	47.5	201	189.2	67.7	261	245.7	87.9
22	20.7	07.4	82	77.2	27.6	142	133.7	47.8	202	190.2	68.0	262	246.7	88.3
23	21.7	07.7	83	78.1	28.0	143	134.6	48.2	203	191.1	68.4	263	247.6	88.6
24	22.6	08.1	84	79.1	28.3	144	135.6	48.5	204	192.1	68.7	264	248.6	88.9
25	23.5	08.4	85	80.0	28.6	145	136.5	48.8	205	193.0	69.1	265	249.5	89.3
26	24.5	08.8	86	81.0	29.0	146	137.5	49.2	206	194.0	69.4	266	250.4	89.6
27	25.4	09.1	87	81.9	29.3	147	138.4	49.5	207	194.9	69.7	267	251.4	89.9
28	26 4	09.4	88	82.9	29.6	148	139.3	49.9	208	195.8	70.1	268	252.3	90.3
29	27.3	09.8	89	83.8	30.0	149	140.3	50.2	209	196.8	70.4	269	253.3	90.6
30	28.2	10.1	90	84.7	30.3	150	141.2	50.5	210	197.7	70.7	270	254.2	91.0
31	29.2	10.4	91	85.7	30.7	151	142.2	50.9	211	198.7	71.1	271	255.2	91.3
32	30.1	10.8	92	86.6	31.0	152	143.1	51.2	212	199.6	71.4	272	256.1	91.6
33	31.1	11.1	93	87.6	31.3	153	144.1	51.5	213	200.5	71.8	273	257.0	92.0
34	32.0	11.5	94	88.5	31.7	154	145.0	51.9	214	201.5	72.1	274	258.0	92.3
35	33.0	11.8	95	89.4	32.0	155	145.9	52.2	215	202.4	72.4	275	258.9	92.6
36	33.9	12.1	96	90.4	32.3	156	146.9	52.5	216	203.4	72.8	276	259.9	93.0
37	34.8	12.5	97	91.3	32.7	157	147.8	52.9	217	204.3	73.1	277	260.8	93.3
38	35.8	12.8	98	92.3	33.0	158	148.8	53.2	218	205.3	73.3	278	261.7	93.7
39	36.7	13.1	99	93.2	33.4	159	149.7	53.6	219	206.2	73.8	279	262.7	94.0
40	37.7	13.5	100	94.2	33.7	160	150.6	53.9	220	207.1	74.1	280	263.6	94.3
41	38.6	13.8	101	95.1	34.0	161	151.6	54.2	221	208.1	74.5	281	264.6	94.7
42	39.5	14.1	102	96.0	34.4	162	152.5	54.6	222	209.0	74.8	282	265.5	95.0
43	40.5	14.5	103	97.0	34.7	163	153.5	54.9	223	210.0	75.1	283	266.5	95.3
44	41.4	14.8	104	97.9	35.0	164	154.4	55.2	224	210.9	75.5	284	267.4	95.7
45	42.4	15.2	105	98.9	35.4	165	155.3	55.6	225	211.8	75.8	285	268.3	96.0
46	43.3	15.5	106	99.8	35.7	166	156.3	55.9	226	212.8	76.1	286	269.3	96.3
47	44.3	15.8	107	100.7	36.0	167	157.2	56.3	227	213.7	76.5	287	270.2	96.7
48	45.2	16.2	108	101.7	36.4	168	158.2	56.6	228	214.7	76.8	288	271.2	97.0
49	46.1	16.5	109	102.6	36.7	169	159.1	56.9	229	215.6	77.1	289	272.1	97.4
50	47.1	16.8	110	103.6	37.1	170	160.1	57.3	230	216.5	77.5	290	273.0	97.7
51	48.0	17.2	111	104.5	37.4	171	161.0	57.6	231	217.5	77.8	291	274.0	98.0
52	49.0	17.5	112	105.4	37.7	172	161.9	57.9	232	218.4	78.2	292	274.9	98.4
53	49.9	17.9	113	106.4	38.1	173	162.9	58.3	233	219.4	78.5	293	275.9	98.7
54	50.8	18.2	114	107.3	38.4	174	163.8	58.6	234	220.3	78.8	294	276.8	99.0
55	51.8	18.5	115	108.3	38.7	175	164.8	59.0	235	221.3	79.2	295	277.7	99.4
56	52.7	18.9	116	109.2	39.1	176	165.7	59.3	236	222.2	79.5	296	278.7	99.7
57	53.7	19.2	117	110.2	39.4	177	166.6	59.6	237	223.1	79.8	297	279.6	100.1
58	54.6	19.5	118	111.1	39.7	178	167.6	60.0	238	224.1	80.2	298	280.6	100.4
59	55.5	19.9	119	112.0	40.1	179	168.5	60.3	239	225.0	80.5	299	281.5	100.7
60	56·5	20.2	120	113.0	40.4	180	169.5	60.6	240	226.0	80.8	300	282.5	101.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 6¼ Points.

TABLE I. Difference of Latitude and Departure for 2 Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	56.4	23.3	121	111.8	46.3	181	167.2	69.3	241	222.7	92.2
2	01.8	00.8	62	57.3	23.7	122	112.7	46.7	182	168.2	69.7	242	223.6	92.6
3	02.8	01.1	63	58.2	24.1	123	113.6	47.1	183	169.1	70.0	243	224.5	93.0
4	03.7	01.5	64	59.1	24.5	124	114.6	47.5	184	170.0	70.4	244	225.4	93.4
5	04.6	01.9	65	60.1	24.9	125	115.5	47.8	185	170.9	70.8	245	226.4	93.8
6	05.5	02.3	66	61.0	25.3	126	116.4	48.2	186	171.8	71.2	246	227.3	94.1
7	06.5	02.7	67	61.9	25.6	127	117.3	48.6	187	172.8	71.6	247	228.2	94.5
8	07.4	03.1	68	62.8	26.0	128	118.3	49.0	188	173.7	71.9	248	229.1	94.9
9	08.3	03.4	69	63.8	26.4	129	119.2	49.4	189	174.6	72.3	249	230.1	95.3
10	09.2	03.8	70	64.7	26.8	130	120.1	49.8	190	175.5	72.7	250	231.0	95.7
11	10.2	04.2	71	65.6	27.2	131	121.0	50.1	191	176.5	73.1	251	231.9	96.1
12	11.1	04.6	72	66.5	27.6	132	122.0	50.5	192	177.4	73.5	252	232.8	96.4
13	12.0	05.0	73	67.4	27.9	133	122.9	50.9	193	178.3	73.9	253	233.7	96.8
14	12.9	05.4	74	68.4	28.3	134	123.8	51.3	194	179.2	74.2	254	234.7	97.2
15	13.9	05.7	75	69.3	28.7	135	124.7	51.7	195	180.2	74.6	255	235.6	97.6
16	14.8	06.1	76	70.2	29.1	136	125.7	52.0	196	181.1	75.0	256	236.5	98.0
17	15.7	06.5	77	71.1	29.5	137	126.6	52.4	197	182.0	75.4	257	237.4	98.4
18	16.6	06.9	78	72.1	29.8	138	127.5	52.8	198	182.9	75.8	258	238.4	98.7
19	17.6	07.3	79	73.0	30.2	139	128.4	53.2	199	183.9	76.2	259	239.3	99.1
20	18.5	07.7	80	73.9	30.6	140	129.3	53.6	200	184.8	76.5	260	240.2	99.5
21	19.4	08.0	81	74.8	31.0	141	130.3	54.0	201	185.7	76.9	261	241.1	99.9
22	20.3	08.4	82	75.8	31.4	142	131.2	54.3	202	186.6	77.3	262	242.1	100.3
23	21.2	08.8	83	76.7	31.8	143	132.1	54.7	203	187.6	77.7	263	243.0	100.6
24	22.2	09.2	84	77.6	32.1	144	133.0	55.1	204	188.5	78.1	264	243.9	101.0
25	23.1	09.6	85	78.5	32.5	145	134.0	55.5	205	189.4	78.5	265	244.8	101.4
26	24.0	10.0	86	79.5	32.9	146	134.9	55.9	206	190.3	78.8	266	245.8	101.8
27	24.9	10.3	87	80.4	33.3	147	135.8	56.3	207	191.2	79.2	267	246.7	102.2
28	25.9	10.7	88	81.3	33.7	148	136.7	56.6	208	192.2	79.6	268	247.6	102.6
29	26.8	11.1	89	82.2	34.1	149	137.7	57.0	209	193.1	80.0	269	248.5	102.9
30	27.7	11.5	90	83.2	34.4	150	138.6	57.4	210	194.0	80.4	270	249.5	103.3
31	28.6	11.9	91	84.1	34.8	151	139.5	57.8	211	194.9	80.8	271	250.4	103.7
32	29.6	12.2	92	85.0	35.2	152	140.4	58.2	212	195.9	81.1	272	251.3	104.1
33	30.5	12.6	93	85.9	35.6	153	141.4	58.6	213	196.8	81.5	273	252.2	104.5
34	31.4	13.0	94	86.8	36.0	154	142.3	58.9	214	197.7	81.9	274	253.1	104.9
35	32.3	13.4	95	87.8	36.4	155	143.2	59.3	215	198.6	82.3	275	254.1	105.2
36	33.3	13.8	96	88.7	36.7	156	144.1	59.7	216	199.6	82.7	276	255.0	105.6
37	34.2	14.2	97	89.6	37.1	157	145.0	60.1	217	200.5	83.0	277	255.9	106.0
38	35.1	14.5	98	90.5	37.5	158	146.0	60.5	218	201.4	83.4	278	256.8	106.4
39	36.0	14.9	99	91.5	37.9	159	146.9	60.8	219	202.3	83.8	279	257.8	106.8
40	37.0	15.3	100	92.4	38.3	160	147.8	61.2	220	203.3	84.2	280	258.7	107.2
41	37.9	15.7	101	93.3	38.7	161	148.7	61.6	221	204.2	84.6	281	259.6	107.5
42	38.8	16.1	102	94.2	39.0	162	149.7	62.0	222	205.1	85.0	282	260.5	107.9
43	39.7	16.5	103	95.2	39.4	163	150.6	62.4	223	206.0	85.3	283	261.5	108.3
44	40.6	16.8	104	96.1	39.8	164	151.5	62.8	224	207.0	85.7	284	262.4	108.7
45	41.6	17.2	105	97.0	40.2	165	152.4	63.1	225	207.9	86.1	285	263.3	109.1
46	42.5	17.6	106	97.9	40.6	166	153.4	63.5	226	208.8	86.5	286	264.2	109.5
47	43.4	18.0	107	98.9	41.0	167	154.3	63.9	227	209.7	86.9	287	265.2	109.8
48	44.4	18.4	108	99.8	41.3	168	155.2	64.3	228	210.6	87.3	288	266.1	110.2
49	45.3	18.8	109	100.7	41.7	169	156.1	64.7	229	211.6	87.6	289	267.0	110.6
50	46.2	19.1	110	101.6	42.1	170	157.1	65.1	230	212.5	88.0	290	267.9	111.0
51	47.1	19.5	111	102.6	42.5	171	158.0	65.4	231	213.4	88.4	291	268.9	111.4
52	48.0	19.9	112	103.5	42.9	172	158.9	65.8	232	214.3	88.8	292	269.8	111.7
53	49.0	20.3	113	104.4	43.2	173	159.8	66.2	233	215.3	89.2	293	270.7	112.1
54	49.9	20.7	114	105.3	43.6	174	160.8	66.6	234	216.2	89.6	294	271.6	112.5
55	50.8	21.0	115	106.3	44.0	175	161.7	67.0	235	217.1	89.9	295	272.5	112.9
56	51.7	21.4	116	107.2	44.4	176	162.6	67.4	236	218.0	90.3	296	273.5	113.3
57	52.7	21.8	117	108.1	44.8	177	163.5	67.7	237	219.0	90.7	297	274.4	113.7
58	53.6	22.2	118	109.0	45.2	178	164.5	68.1	238	219.9	91.1	298	275.3	114.0
59	54.5	22.6	119	109.9	45.5	179	165.4	68.5	239	220.8	91.5	299	276.2	114.4
60	55.4	23.0	120	110.9	45.9	180	166.3	68.9	240	221.7	91.8	300	277.2	114.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 6 Points.

TABLE I. Difference of Latitude and Departure for 2 ¼ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat,	Dep
1	00.9	00.4	61	55.1	26.1	121	109.4	51.7	181	163.6	77.4	241	217.9	103.0
2	01.8	00.9	62	56.0	26.5	122	110.3	52.2	182	164.5	77.8	242	218.8	103.5
3	02.7	01.3	63	57.0	26.9	123	111.2	52.6	183	165.4	78.3	243	219.7	103.9
4	03.6	01.7	64	57.9	27.4	124	112.1	53.0	184	166.3	78.7	244	220.6	104.3
5	04.5	02.1	65	58.8	27.8	125	113.0	53.5	185	167.2	79.1	245	221.5	104.8
6	05.4	02.6	66	59.7	28.2	126	113.9	53.9	186	168.1	79.5	246	222.4	105.2
7	06.3	03.0	67	60.6	28.6	127	114.8	54.3	187	169.0	80.0	247	223.3	105.6
8	07.2	03.4	68	61.5	29.1	128	115.7	54.7	188	169.9	80.4	248	224.2	106.0
9	08.1	03.8	69	62.4	29.5	129	116.6	55.2	189	170.9	80.8	249	225.1	106.5
10	09.0	04.3	70	63.3	29.9	130	117.5	55.6	190	171.8	81.2	250	226.0	106.9
11	09.9	04.7	71	64.2	30.4	131	118.4	56.0	191	172.7	81.7	251	226.9	107.3
12	10.8	05.1	72	65.1	30.8	132	119.3	56.4	192	173.6	82.1	252	227.8	107.8
13	11.8	05.6	73	66.0	31.2	133	120.2	56.9	193	174.5	82.5	253	228.7	108.2
14	12.7	06.0	74	66.9	31.6	134	121.1	57.3	194	175.4	83.0	254	229.6	108.6
15	13.6	06.4	75	67.8	32.1	135	122.0	57.7	195	176.3	83.4	255	230.5	109.0
16	14.5	06.8	76	68.7	32.5	136	122.9	58.2	196	177.2	83.8	256	231.4	109.5
17	15.4	07.3	77	69.6	32.9	137	123.8	58.6	197	178.1	84.2	257	232.3	109.9
18	16.3	07.7	78	70.5	33.4	138	124.7	59.0	198	179.0	84.7	258	233.2	110.3
19	17.2	08.1	79	71.4	33.8	139	125.7	59.4	199	179.9	85.1	259	234.1	110.7
20	18.1	08.6	80	72.3	34.2	140	126.6	59.9	200	180.8	85.5	260	235.0	111.2
21	19.0	09.0	81	73.2	34.6	141	127.5	60.3	201	181.7	85.9	261	235.9	111.6
22	19.9	09.4	82	74.1	35.1	142	128.4	60.7	202	182.6	86.4	262	236.8	112.0
23	20.8	09.8	83	75.0	35.5	143	129.3	61.2	203	183.5	86.8	263	237.7	112.5
24	21.7	10.3	84	75.9	35.9	144	130.2	61.6	204	184.4	87.2	264	238.7	112.9
25	22.6	10.7	85	76.8	36.3	145	131.1	62.0	205	185.3	87.7	265	239.6	113.3
26	23.5	11.1	86	77.7	36.8	146	132.0	62.4	206	186.2	88.1	266	240.5	113.7
27	24.4	11.5	87	78.6	37.2	147	132.9	62.9	207	187.1	88.5	267	241.4	114.2
28	25.3	12.0	88	79.6	37.6	148	133.8	63.3	208	188.0	88.9	268	242.3	114.6
29	26.2	12.4	89	80.5	38.1	149	134.7	63.7	209	188.9	89.4	269	243.2	115.0
30	27.1	12.8	90	81.4	38.5	150	135.6	64.1	210	189.8	89.8	270	244.1	115.4
31	28.0	13.3	91	82.3	38.9	151	136.5	64.6	211	190.7	90.2	271	245.0	115.9
32	28.9	13.7	92	83.2	39.3	152	137.4	65.0	212	191.6	90.6	272	245.9	116.3
33	29.8	14.1	93	84.1	39.8	153	138.3	65.4	213	192.6	91.1	273	246.8	116.7
34	30.7	14.5	94	85.0	40.2	154	139.2	65.9	214	193.5	91.5	274	247.7	117.2
35	31.6	15.0	95	85.9	40.6	155	140.1	66.3	215	194.4	91.9	275	248.6	117.6
36	32.5	15.4	96	86.8	41.1	156	141.0	66.7	216	195.3	92.4	276	249.5	118.0
37	33.4	15.8	97	87.7	41.5	157	141.9	67.1	217	196.2	92.8	277	250.4	118.4
38	34.4	16.2	98	88.6	41.9	158	142.8	67.6	218	197.1	93.2	278	251.3	118.9
39	35.3	16.7	99	89.5	42.3	159	143.7	68.0	219	198.0	93.6	279	252.2	119.3
40	36.2	17.1	100	90.4	42.8	160	144.6	68.4	220	198.9	94.1	280	253.1	119.7
41	37.1	17.5	101	91.3	43.2	161	145.5	68.8	221	199.8	94.5	281	254.0	120.2
42	38.0	18.0	102	92.2	43.6	162	146.4	69.3	222	200.7	94.9	282	254.9	120.6
43	38.9	18.4	103	93.1	44.0	163	147.3	69.7	223	201.6	95.4	283	255.8	121.0
44	39.8	18.8	104	94.0	44.5	164	148.3	70.1	224	202.5	95.8	284	256.7	121.4
45	40.7	19.2	105	94.9	44.9	165	149.2	70.6	225	203.4	96.2	285	257.6	121.9
46	41.6	19.7	106	95.8	45.3	166	150.1	71.0	226	204.3	96.6	286	258.5	122.3
47	42.5	20.1	107	96.7	45.8	167	151.0	71.4	227	205.2	97.1	287	259.4	122.7
48	43.4	20.5	108	97.6	46.2	168	151.9	71.8	228	206.1	97.5	288	260.3	123.1
49	44.3	21.0	109	98.5	46.6	169	152.8	72.3	229	207.0	97.9	289	261.3	123.6
50	45.2	21.4	110	99.4	47.0	170	153.7	72.7	230	207.9	98.3	290	262.2	124.0
51	46.1	21.8	111	100.3	47.5	171	154.6	73.1	231	208.8	98.8	291	263.1	124.4
52	47.0	22.2	112	101.2	47.9	172	155.5	73.6	232	209.7	99.2	292	264.0	124.9
53	47.9	22.7	113	102.1	48.3	173	156.4	74.0	233	210.6	99.6	293	264.9	125.3
54	48.8	23.1	114	103.1	48.7	174	157.3	74.4	234	211.5	100.1	294	265.8	125.7
55	49.7	23.5	115	104.0	49.2	175	158.2	74.8	235	212.4	100.5	295	266.7	126.1
56	50.6	23.9	116	104.9	49.6	176	159.1	75.3	236	213.3	100.9	296	267.6	126.6
57	51.5	24.4	117	105.8	50.0	177	160.0	75.7	237	214.2	101.3	297	268.5	127.0
58	52.4	24.8	118	106.7	50.5	178	160.9	76.1	238	215.1	101.8	298	269.4	127.4
59	53.3	25.2	119	107.6	50.9	179	161.8	76.5	239	216.1	102.2	299	270.3	127.8
60	54.2	25.7	120	108.5	51.3	180	162.7	77.0	240	217.0	102.6	300	271.2	128.3
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat,	Dist	Dep,	Lat,	Dist	Dep	Lat.

For 5 ¾ Points.

TABLE I. Difference of Latitude and Departure for 2½ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	53.8	28.8	121	106.7	57.0	181	159.6	85.3	241	212.5	113.6
2	01.8	00.9	62	54.7	29.2	122	107.6	57.5	182	160.5	85.8	242	213.4	114.1
3	02.6	01.4	63	55.6	29.7	123	108.5	58.0	183	161·4	86.3	243	214.3	114.6
4	03.5	01.9	64	56.4	30.2	124	109.4	58.4	184	162.3	86.7	244	215.2	115.0
5	04.4	02.4	65	57.3	30.6	125	110.2	58.9	185	163.2	87.2	245	216.1	115.5
6	05.3	02.8	66	58.2	31.1	126	111.1	59.4	186	164.0	87.7	246	217.0	116.0
7	06.2	03.3	67	59.1	31.6	127	112.0	59.9	187	164.9	88.1	247	217.8	116.4
8	07.1	03.8	68	60.0	32.1	128	112.9	60.3	188	165.8	88.6	248	218.7	116.9
9	07.9	04.2	69	60.9	32.5	129	113.8	60.8	189	166.7	89.1	249	219.6	117.4
10	08.8	04.7	70	61.7	33.0	130	114.7	61.3	190	167.6	89.6	250	220.5	117.8
11	09.7	05.2	71	62.6	33.5	131	115.5	61.7	191	168.5	90.0	251	221.4	118.3
12	10.6	05.7	72	63.5	33.9	132	116.4	62.2	192	169.3	90.5	252	222.2	118.8
13	11.5	06.1	73	64.4	34.4	133	117.3	62.7	193	170.2	91.0	253	223.1	119.3
14	12.3	06.6	74	65.3	34.9	134	118.2	63.2	194	171.1	91.4	254	224.0	119.7
15	13.2	07.1	75	66.1	35.4	135	119.1	63.6	195	172.0	91.9	255	224.9	120.2
16	14.1	07.5	76	67.0	35.8	136	119.9	64.1	196	172.9	92.4	356	225.8	120.7
17	15.0	08.0	77	67.9	36.3	137	120.8	64.6	197	173.7	92.9	257	226.7	121.1
18	15.9	08.5	78	68.8	36.8	138	121.7	65.0	198	174.6	93.3	258	227.5	121.6
19	16.8	09.0	79	69.7	37.2	139	122.6	65.5	199	175.5	93.8	259	228.4	122.1
20	17.6	09.4	80	70.6	37.7	140	123.5	66.0	200	176.4	94.3	260	229.3	122.6
21	18.5	09.9	81	71.4	38.2	141	124.4	66.5	201	177.3	94.7	261	230.2	123.0
22	19.4	10.4	82	72.3	38.6	142	125.2	66.9	202	178.2	95.2	262	231.1	123.5
23	20.3	10.8	83	73.2	39.1	143	126.1	67.4	203	179.0	95.7	263	231.9	124.0
24	21.2	11.3	84	74.1	39.6	144	127.0	67.9	204	179.9	96.2	264	232.8	124.4
25	22.1	11.8	85	75.0	40.1	145	127.9	68.3	205	180.8	96.6	265	233.7	124.9
26	22.9	12.3	86	75.9	40.5	146	128.8	68.8	206	181.7	97.1	266	234.6	125.4
27	23.8	12.7	87	76.7	41.0	147	129.6	69.3	207	182.6	97.6	267	235.5	125.9
28	24.7	13.2	88	77.6	41.5	148	130.5	69.8	208	183.4	98.0	268	236.4	126.3
29	25.6	13.7	89	78.5	41.9	149	131.4	70.2	209	184.3	98.5	269	237.2	126.8
30	26.5	14.1	90	79.4	42.4	150	132.3	70.7	210	185.2	99.0	270	238.1	127.3
31	27.3	14.6	91	80.3	42.9	151	133.2	71.2	211	186.1	99.5	271	239.0	127.7
32	28.2	15.1	92	81.1	43.4	152	134.1	71.6	212	187.0	99.9	272	239.9	128.2
33	29.1	15.6	93	82.0	43.8	153	134.9	72.1	213	187.8	100.4	273	240.8	128.7
34	30.0	16.0	94	82.9	44.3	154	135.8	72.6	214	188.7	100.9	274	241.7	129.2
35	30.9	16.5	95	83.8	44.8	155	136.7	73.1	215	189.6	101.3	275	242.5	129.6
36	31.8	17.0	96	84.7	45.2	156	137.6	73.5	216	190.5	101.8	276	243.4	130.1
37	32.6	17.4	97	85.6	45.7	157	138.5	74.0	217	191.4	102.3	277	244.3	130.6
38	33.5	17.9	98	86.4	46.2	158	139.3	74.5	218	192.3	102.8	278	245.2	131.0
39	34.4	18.4	99	87.3	46.7	159	140.2	74.9	219	193.1	103.2	279	246.1	131.5
40	35.3	18.9	100	88.2	47.1	160	141.1	75.4	220	194.0	103.7	280	246.9	132.0
41	36.2	19.3	101	89.1	47.6	161	142.0	75.9	221	194.9	104.2	281	247.8	132.5
42	37.0	19.8	102	90.0	48.1	162	142.9	76.4	222	195.8	104.6	282	248.7	132.9
43	37.9	20.3	103	90.8	48.5	163	143.8	76.8	223	196.7	105.1	283	249.6	133.4
44	38.8	20.7	104	91.7	49.0	164	144.6	77.3	224	197.6	105.6	284	250.5	133.9
45	39.7	21.2	105	92.6	49.5	165	145.5	77.8	225	198.4	106.1	285	251.4	134.3
46	40.6	21.7	106	93.5	50.0	166	146.4	78.2	226	199.3	106.5	286	252.2	134.8
47	41.5	22.2	107	94.4	50.4	167	147.3	78.7	227	200.2	107.0	287	253.1	135.3
48	42.3	22.6	108	95.3	50.9	168	148.2	79.2	228	201.1	107.5	288	254.0	135.8
49	43.2	23.1	109	96.1	51.4	169	149.0	79.7	229	202.0	107.9	289	254.9	136.2
50	44.1	23.6	110	97.0	51.8	170	149.9	80.1	230	202.8	108.4	290	255.8	136.7
51	45.0	24.0	111	97.9	52.3	171	150.8	80.6	231	203.7	108.9	291	256.6	137.2
52	45.9	24.5	112	98.8	52.8	172	151.7	81.1	232	204.6	109.4	292	257.5	137.6
53	46.7	25.0	113	99.7	53.3	173	152.6	81.5	233	205.5	109.8	293	258.4	138.1
54	47.6	25.5	114	100.5	53.7	174	153.5	82.0	234	206.4	110.3	294	259.3	138.6
55	48.5	25.9	115	101.4	54.2	175	154.3	82.5	235	207.3	110.8	295	260.2	139.1
56	49.4	26.4	116	102.3	54.7	176	155.2	83.0	236	208.1	111.2	296	261.1	139.5
57	50.3	26.9	117	103.2	55.1	177	156.1	83.4	237	209.0	111.7	297	261.9	140.0
58	51.2	27.3	118	104.1	55.6	178	157.0	83.9	238	209.9	112.2	298	262.8	140.5
59	52.0	27.8	119	105.0	56.1	179	157.9	84.4	239	210.8	112.7	299	263.7	140.9
60	52.9	28.3	120	105.8	56.6	180	158.8	84.8	240	211.7	113.1	300	264.6	141.4
Dis	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 5½ Points.

TABLE I. Difference of Latitude and Departure for 2¾ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	52.3	31.4	121	103.8	62.2	181	155.3	93.0	241	206.7	123.9
2	01.7	01.0	62	53.2	31.9	122	104.6	62.7	182	156.1	93.6	242	207.6	124.4
3	02.6	01.5	63	54.0	32.4	123	105.5	63.2	183	157.0	94.1	243	208.4	124.9
4	03.4	02.1	64	54.9	32.9	124	106.4	63.7	184	157.8	94.6	244	209.3	125.4
5	04.3	02.6	65	55.8	33.4	125	107.2	64.3	185	158.7	95.1	245	210.1	125.9
6	05.1	03.1	66	56.6	33.9	126	108.1	64.8	186	159.5	95.6	246	211.0	126.5
7	06.0	03.6	67	57.5	34.4	127	108.9	65.3	187	160.4	96.1	247	211.9	127.0
8	06.9	04.1	68	58.3	35.0	128	109.8	65.8	188	161.2	96.6	248	212.7	127.5
9	07.7	04.6	69	59.2	35.5	129	110.6	66.3	189	162.1	97.2	249	213.6	128.0
10	08.6	05.1	70	60.0	36.0	130	111.5	66.8	190	163.0	97.7	250	214.4	128.5
11	09.4	05.7	71	60.9	36.5	131	112.4	67.3	191	163.8	98.2	251	215.3	129.0
12	10.3	06.2	72	61.8	37.0	132	113.2	67.9	192	164.7	98.7	252	216.1	129.5
13	11.2	06.7	73	62.6	37.5	133	114.1	68.4	193	165.5	99.2	253	217.0	130.1
14	12.0	07.2	74	63.5	38.0	134	114.9	68.9	194	166.4	99.7	254	217.9	130.6
15	12.9	07.7	75	64.3	38.6	135	115.8	69.4	195	167.3	100.2	255	218.7	131.1
16	13.7	08.2	76	65.2	39.1	136	116.6	69.9	196	168.1	100.8	256	219.6	131.6
17	14.6	08.7	77	66.0	39.6	137	117.5	70.4	197	169.0	101.3	257	220.4	132.1
18	15.4	09.3	78	66.9	40.1	138	118.4	70.9	198	169.8	101.8	258	221.3	132.6
19	16.3	09.8	79	67.8	40.6	139	119.2	71.5	199	170.7	102.3	259	222.1	133.1
20	17.2	10.3	80	68.6	41.1	140	120.1	72.0	200	171.5	102.8	260	223.0	133.7
21	18.0	10.8	81	69.5	41.6	141	120.9	72.5	201	172.4	103.3	261	223.9	134.2
22	18.9	11.3	82	70.3	42.2	142	121.8	73.0	202	173.3	103.8	262	224.7	134.7
23	19.7	11.8	83	71.2	42.7	143	122.7	73.5	203	174.1	104.4	263	225.6	135.2
24	20.6	12.3	84	72.0	43.2	144	123.5	74.0	204	175.0	104.9	264	226.4	135.7
25	21.4	12.9	85	72.9	43.7	145	124.4	74.5	205	175.8	105.4	265	227.3	136.2
26	22.3	13.4	86	73.8	44.2	146	125.2	75.1	206	176.7	105.9	266	228.2	136.7
27	23.2	13.9	87	74.6	44.7	147	126.1	75.6	207	177.5	106.4	267	229.0	137.3
28	24.0	14.4	88	75.5	45.2	148	126.9	76.1	208	178.4	106.9	268	229.9	137.8
29	24.9	14.9	89	76.3	45.7	149	127.8	76.6	209	179.3	107.4	269	230.7	138.3
30	25.7	15.4	90	77.2	46.3	150	128.7	77.1	210	180.1	108.0	270	231.6	138.8
31	26.6	15.9	91	78.1	46.8	151	129.5	77.6	211	181.0	108.5	271	232.4	139.3
32	27.4	16.4	92	78.9	47.3	152	130.4	78.1	212	181.8	109.0	272	233.3	139.8
33	28.3	17.0	93	79.8	47.8	153	131.2	78.7	213	182.7	109.5	273	234.2	140.3
34	29.2	17.5	94	80.6	48.3	154	132.1	79.2	214	183.5	110.0	274	235.0	140.9
35	30.0	18.0	95	81.5	48.8	155	132.9	79.7	215	184.4	110.5	275	235.9	141.4
36	30.9	18.5	96	82.3	49.3	156	133.8	80.2	216	185.3	111.0	276	236.7	141.9
37	31.7	19.0	97	83.2	49.9	157	134.7	80.7	217	186.1	111.6	277	237.6	142.4
38	32.6	19.5	98	84.1	50.4	158	135.5	81.2	218	187.0	112.1	278	238.4	142.9
39	33.5	20.0	99	84.9	50.9	159	136.4	81.7	219	187.8	112.6	279	239.3	143.4
40	34.3	20.6	100	85.8	51.5	160	137.2	82.3	220	188.7	113.1	280	240.2	143.9
41	35.2	21.1	101	86.6	51.9	161	138.1	82.8	221	189.6	113.6	281	241.0	144.5
42	36.0	21.6	102	87.5	52.4	162	138.9	83.3	222	190.4	114.1	282	241.0	145.0
43	36.9	22.1	103	88.3	52.9	163	139.8	83.8	223	191.3	114.6	283	242.7	145.5
44	37.7	22.6	104	89.2	53.5	164	140.7	84.3	224	192.1	115.2	284	243.6	146.0
45	38.6	23.1	105	90.1	54.0	165	141.5	84.8	225	193.0	115.7	285	244.4	146.5
46	39.5	23.6	106	90.9	54.5	166	142.4	85.3	226	193.8	116.2	286	245.3	147.0
47	40.3	24.2	107	91.8	55.0	167	143.2	85.8	227	194.7	116.7	287	246.2	147.5
48	41.2	24.7	108	92.6	55.5	168	144.1	86.4	228	195.6	117.2	288	247.0	148.1
49	42.0	25.2	109	93.5	56.0	169	145.0	86.9	229	196.4	117.7	289	247.9	148.6
50	42.9	25.7	110	94.3	56.5	170	145.8	87.4	230	197.3	118.2	290	248.7	149.1
51	43.7	26.2	111	95.2	57.1	171	146.7	87.9	231	198.1	118.8	291	249.6	149.6
52	44.6	26.7	112	96.1	57.6	172	147.5	88.4	232	199.0	119.3	292	250.5	150.1
53	45.5	27.2	113	96.9	58.1	173	148.4	88.9	233	199.8	119.8	293	251.3	150.6
54	46.3	27.8	114	97.8	58.6	174	149.2	89.4	234	200.7	120.3	294	252.2	151.1
55	47.2	28.3	115	98.6	59.1	175	150.1	90.0	235	201.6	120.8	295	253.0	151.7
56	48.0	28.8	116	99.5	59.6	176	151.0	90.5	236	202.4	121.3	296	253.9	152.2
57	48.9	29.3	117	100.4	60.1	177	151.8	91.0	237	203.3	121.8	297	254.7	152.7
58	49.7	29.8	118	101.2	60.7	178	152.7	91.5	238	204.1	122.4	298	255.6	153.2
59	50.6	30.3	119	102.1	61.2	179	153.5	92.0	239	205.0	122.9	299	256.5	153.7
60	51.5	30.8	120	102.9	61.7	180	154.4	92.5	240	205.9	123.4	300	257.3	154.2
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 5¼ Points.

TABLE I. Difference of Latitude and Departure for 3 Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	50.7	33.9	121	100.6	67.2	181	150.5	100.6	241	200.4	133.9
2	01.7	01.1	62	51.5	34.4	122	101.4	67.8	182	151.3	101.1	242	201.2	134.4
3	02.5	01.7	63	52.4	35.0	123	102.3	68.3	183	152.2	101.7	243	202.0	135.0
4	03.3	02.2	64	53.2	35.6	124	103.1	68.9	184	153.0	102.2	244	202.9	135.6
5	04.2	02.8	65	54.0	36.1	125	103.9	69.4	185	153.8	102.8	245	203.7	136.1
6	05.0	03.3	66	54.9	36.7	126	104.8	70.0	186	154.6	103.3	246	204.5	136.7
7	05.8	03.9	67	55.7	37.2	127	105.6	70.6	187	155.5	103.9	247	205.4	137.2
8	06.7	04.4	68	56.5	37.8	128	106.4	71.1	188	156.3	104.4	248	206.2	137.8
9	07.5	05.0	69	57.4	38.3	129	107.3	71.7	189	157.1	105.0	249	207.0	138.3
10	08.3	05.6	70	58.2	38.9	130	108.1	72.2	190	158.0	105.6	250	207.9	138.9
11	09.1	06.1	71	59.0	39.4	131	108.9	72.8	191	158.8	106.1	251	208.7	139.4
12	10.0	06.7	72	59.9	40.0	132	109.7	73.3	192	159.6	106.7	252	209.5	140.0
13	10.8	07.2	73	60.7	40.6	133	110.6	73.9	193	160.5	107.2	253	210.4	140.6
14	11.6	07.8	74	61.5	41.1	134	111.4	74.4	194	161.3	107.8	254	211.2	141.1
15	12.5	08.3	75	62.4	41.7	135	112.2	75.0	195	162.1	108.3	255	212.0	141.7
16	13.3	08.9	76	63.2	42.2	136	113.1	75.6	196	163.0	108.9	256	212.9	142.2
17	14.1	09.4	77	64.0	42.8	137	113.9	76.1	197	163.8	109.4	257	213.7	142.8
18	15.0	10.0	78	64.8	43.3	138	114.7	76.7	198	164.6	110.0	258	214.5	143.3
19	15.8	10.6	79	65.7	43.9	139	115.6	77.2	199	165.5	110.6	259	215.3	143.9
20	16.6	11.1	80	66.5	44.4	140	116.4	77.8	200	166.3	111.1	260	216.2	144.4
21	17.5	11.7	81	67.3	45.0	141	117.2	78.3	201	167.1	111.7	261	217.0	145.0
22	18.3	12.2	82	68.2	45.6	142	118.1	78.9	202	168.0	112.2	262	217.8	145.6
23	19.1	12.8	83	69.0	46.1	143	118.9	79.4	203	168.8	112.8	263	218.7	146.1
24	20.0	13.3	84	69.8	46.7	144	119.7	80.0	204	169.6	113.3	264	219.5	146.7
25	20.8	13.9	85	70.7	47.2	145	120.6	80.6	205	170.4	113.9	265	220.3	147.2
26	21.6	14.4	86	71.5	47.8	146	121.4	81.1	206	171.3	114.4	266	221.2	147.8
27	22.4	15.0	87	72.3	48.3	147	122.2	81.7	207	172.1	115.0	267	222.0	148.3
28	23.3	15.6	88	73.2	48.9	148	123.1	82.2	208	172.9	115.6	268	222.8	148.9
29	24.1	16.1	89	74.0	49.4	149	123.9	82.8	209	173.8	116.1	269	223.7	149.4
30	24.9	16.7	90	74.8	50.0	150	124.7	83.3	210	174.6	116.7	270	224.5	150.0
31	25.8	17.2	91	75.7	50.6	151	125.5	83.9	211	175.4	117.2	271	225.3	150.6
32	26.6	17.8	92	76.5	51.1	152	126.4	84.4	212	176.3	117.8	272	226.2	151.1
33	27.4	18.3	93	77.3	51.7	153	127.2	85.0	213	177.1	118.3	273	227.0	151.7
34	28.3	18.9	94	78.2	52.2	154	128.0	85.6	214	177.9	118.9	274	227.8	152.2
35	29.1	19.4	95	79.0	52.8	155	128.9	86.1	215	178.8	119.4	275	228.6	152.8
36	29.9	20.0	96	79.8	53.3	156	129.7	86.7	216	179.6	120.0	276	229.5	153.3
37	30.8	20.6	97	80.6	53.9	157	130.5	87.2	217	180.4	120.6	277	230.3	153.9
38	31.6	21.1	98	81.5	54.4	158	131.4	87.8	218	181.3	121.1	278	231.1	154.4
39	32.4	21.7	99	82.3	55.0	159	132.2	88.3	219	182.1	121.7	279	232.0	155.0
40	33.3	22.2	100	83.1	55.6	160	133.0	88.9	220	182.9	122.2	280	232.8	155.6
41	34.1	22.8	101	84.0	56.1	161	133.9	89.4	221	183.7	122.8	281	233.6	156.1
42	34.9	23.3	102	84.8	56.7	162	134.7	90.0	222	184.6	123.3	282	234.5	156.7
43	35.8	23.9	103	85.6	57.2	163	135.5	90.6	223	185.4	123.9	283	235.3	157.2
44	36.6	24.4	104	86.5	57.8	164	136.4	91.1	224	186.2	124.4	284	236.1	157.8
45	37.4	25.0	105	87.3	58.3	165	137.2	91.7	225	187.1	125.0	285	237.0	158.3
46	38.2	25.6	106	88.1	58.9	166	138.0	92.2	226	187.9	125.6	286	237.8	158.9
47	39.1	26.1	107	89.0	59.4	167	138.9	92.8	227	188.7	126.1	287	238.6	159.4
48	39.9	26.7	108	89.8	60.0	168	139.7	93.3	228	189.6	126.7	288	239.5	160.0
49	40.7	27.2	109	90.6	60.6	169	140.5	93.9	229	190.4	127.2	289	240.3	160.6
50	41.6	27.8	110	91.5	61.1	170	141.3	94.4	230	191.2	127.8	290	241.1	161.1
51	42.4	28.3	111	92.3	61.7	171	142.2	95.0	231	192.1	128.3	291	242.0	161.7
52	43.2	28.9	112	93.1	62.2	172	143.0	95.6	232	192.9	128.9	292	242.8	162.2
53	44.1	29.4	113	94.0	62.8	173	143.8	96.1	233	193.7	129.4	293	243.6	162.8
54	44.9	30.0	114	94.8	63.3	174	144.7	96.7	234	194.6	130.1	294	244.4	163.3
55	45.7	30.6	115	95.6	63.9	175	145.5	97.2	235	195.4	130.6	295	245.3	163.9
56	46.6	31.1	116	96.4	64.4	176	146.3	97.8	236	196.2	131.1	296	246.1	164.4
57	47.4	31.7	117	97.3	65.0	177	147.2	98.3	237	197.1	131.8	297	246.9	165.0
58	48.2	32.2	118	98.1	65.6	178	148.0	98.9	238	197.9	132.2	298	247.8	165.6
59	49.1	32.8	119	98.9	66.1	179	148.8	99.4	239	198.7	132.8	299	248.6	166.1
60	49.9	33.3	120	99.8	66.7	180	149.7	100.0	240	199.5	133.3	300	249.4	166.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 5 Points.

TABLE I. Difference of Latitude and Departure for 3¼ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	49.0	36.3	121	97.2	72.1	181	145.4	107.8	241	193.6	143.6
2	01.6	01.2	62	49.8	36.9	122	98.0	72.7	182	146.2	108.4	242	194.4	144.2
3	02.4	01.8	63	50.6	37.5	123	98.8	73.3	183	147.0	109.0	243	195.2	144.8
4	03.2	02.4	64	51.4	38.1	124	99.6	73.9	184	147.8	109.6	244	196.0	145.4
5	04.0	03.0	65	52.2	38.7	125	100.4	74.5	185	148.6	110.2	245	196.8	146.0
6	04.8	03.6	66	53.0	39.3	126	101.2	75.1	186	149.4	110.8	246	197.6	146.5
7	05.6	04.2	67	53.8	39.9	127	102.0	75.7	187	150.2	111.4	247	198.4	147.1
8	06.4	04.8	68	54.6	40.5	128	102.8	76.3	188	151.0	112.0	248	199.2	147.7
9	07.2	05.4	69	55.4	41.1	129	103.6	76.9	189	151.8	112.6	249	200.0	148.3
10	08.0	06.0	70	56.2	41.7	130	104.4	77.4	190	152.6	113.2	250	200.8	148.9
11	08.8	06.6	71	57.0	42.3	131	105.2	78.0	191	153.4	113.8	251	201.6	149.5
12	09.6	07.1	72	57.8	42.9	132	106.0	78.6	192	154.2	114.4	252	202.4	150.1
13	10.4	07.7	73	58.6	43.5	133	106.8	79.2	193	155.0	115.0	253	203.2	150.7
14	11.2	08.3	74	59.4	44.1	134	107.6	79.8	194	155.8	115.6	254	204.0	151.3
15	12.0	08.9	75	60.2	44.7	135	108.4	80.4	195	156.6	116.2	255	204.8	151.9
16	12.8	09.5	76	61.0	45.3	136	109.2	81.0	196	157.4	116.8	256	205.6	152.5
17	13.7	10.1	77	61.8	45.9	137	110.0	81.6	197	158.2	117.4	257	206.4	153.1
18	14.5	10.7	78	62.6	46.5	138	110.8	82.2	198	159.0	118.0	258	207.2	153.7
19	15.3	11.3	79	63.4	47.1	139	111.6	82.8	199	159.8	118.5	259	208.0	154.3
20	16.1	11.9	80	64.3	47.7	140	112.4	83.4	200	160.6	119.1	260	208.8	154.9
21	16.9	12.5	81	65.1	48.3	141	113.2	84.0	201	161.4	119.7	261	209.6	155.5
22	17.7	13.1	82	65.9	48.9	142	114.0	84.6	202	162.2	120.3	262	210.4	156.1
23	18.5	13.7	83	66.7	49.4	143	114.9	85.2	203	163.0	120.9	263	211.2	156.7
24	19.3	14.3	84	67.5	50.0	144	115.7	85.8	204	163.9	121.5	264	212.0	157.3
25	20.1	14.9	85	68.3	50.6	145	116.5	86.4	205	164.7	122.1	265	212.8	157.9
26	20.9	15.5	86	69.1	51.2	146	117.3	87.0	206	165.5	122.7	266	213.6	158.5
27	21.7	16.1	87	69.9	51.8	147	118.1	87.6	207	166.3	123.3	267	214.5	159.1
28	22.5	16.7	88	70.7	52.4	148	118.9	88.2	208	167.1	123.9	268	215.3	159.6
29	23.3	17.3	89	71.5	53.0	149	119.7	88.8	209	167.9	124.5	269	216.1	160.2
30	24.1	17.9	90	72.3	53.6	150	120.5	89.4	210	168.7	125.1	270	216.9	160.8
31	24.9	18.5	91	73.1	54.2	151	121.3	90.0	211	169.5	125.7	271	217.7	161.4
32	25.7	19.1	92	73.9	54.8	152	122.1	90.5	212	170.3	126.3	272	218.5	162.0
33	26.5	19.7	93	74.7	55.4	153	122.9	91.1	213	171.1	126.9	273	219.3	162.6
34	27.3	20.3	94	75.5	56.0	154	123.7	91.7	214	171.9	127.5	274	220.1	163.2
35	28.1	20.9	95	76.3	56.6	155	124.5	92.3	215	172.7	128.1	275	220.9	163.8
36	28.9	21.4	96	77.1	57.2	156	125.3	92.9	216	173.5	128.7	276	221.7	164.4
37	29.7	22.0	97	77.9	57.8	157	126.1	93.5	217	174.3	129.3	277	222.5	165.0
38	30.5	22.6	98	78.7	58.4	158	126.9	94.1	218	175.1	129.9	278	223.3	165.6
39	31.3	23.2	99	79.5	59.0	159	127.7	94.7	219	175.9	130.5	279	224.1	166.2
40	32.1	23.8	100	80.3	59.6	160	128.5	95.3	220	176.7	131.1	280	224.9	166.8
41	32.9	24.4	101	81.1	60.2	161	129.3	95.9	221	177.5	131.7	281	225.7	167.4
42	33.7	25.0	102	81.9	60.8	162	130.1	96.5	222	178.3	132.2	282	226.5	168.0
43	34.5	25.6	103	82.7	61.4	163	130.9	97.1	223	179.1	132.8	283	227.3	168.6
44	35.3	26.2	104	83.5	62.0	164	131.7	97.7	224	179.9	133.4	284	228.1	169.2
45	36.1	26.8	105	84.3	62.6	165	132.5	98.3	225	180.7	134.0	285	228.9	169.8
46	36.9	27.4	106	85.1	63.1	166	133.3	98.9	226	181.5	134.6	286	229.7	170.4
47	37.7	28.0	107	85.9	63.7	167	134.1	99.5	227	182.3	135.2	287	230.5	171.0
48	38.6	28.6	108	86.7	64.3	168	134.9	100.1	228	183.1	135.8	288	231.3	171.6
49	39.4	29.2	109	87.5	64.9	169	135.7	100.7	229	183.9	136.4	289	232.1	172.2
50	40.2	29.8	110	88.4	65.5	170	136.5	101.3	230	184.7	137.0	290	232.9	172.8
51	41.0	30.4	111	89.2	66.1	171	137.3	101.9	231	185.5	137.6	291	233.7	173.3
52	41.8	31.0	112	90.0	66.7	172	138.1	102.5	232	186.3	138.2	292	234.5	173.9
53	42.6	31.6	113	90.8	67.3	173	138.9	103.1	233	187.1	138.8	293	235.3	174.5
54	43.4	32.2	114	91.6	67.9	174	139.8	103.7	234	187.9	139.4	294	236.1	175.1
55	44.2	32.8	115	92.4	68.5	175	140.6	104.2	235	188.8	140.0	295	236.9	175.7
56	45.0	33.4	116	93.2	69.1	176	141.4	104.8	236	189.6	140.6	296	237.7	176.3
57	45.8	34.0	117	94.0	69.7	177	142.2	105.4	237	190.4	141.2	297	238.5	176.9
58	46.6	34.6	118	94.8	70.3	178	143.0	106.0	238	191.2	141.8	298	239.4	177.5
59	47.4	35.1	119	95.6	70.9	179	143.8	106.6	239	192.0	142.4	299	240.2	178.1
60	48.2	35.7	120	96.4	71.5	180	144.6	107.2	240	192.8	143.0	300	241.0	178.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 4¾ Points.

TABLE I. Difference of Latitude and Departure for 3½ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	47.1	38.7	121	93.5	76.8	181	139.9	114.9	241	186.3	152.9
2	01.5	01.3	62	47.9	39.3	122	94.3	77.4	182	140.7	115.5	242	187.1	153.5
3	02.3	01.9	63	48.7	40.0	123	95.1	78.0	183	141.5	116.1	243	187.8	154.2
4	03.1	02.5	64	49.5	40.6	124	95.8	78.7	184	142.2	116.7	244	188.6	154.7
5	03.9	03.2	65	50.2	41.2	125	96.6	79.3	185	143.0	117.4	245	189.4	155.4
6	04.6	03.8	66	51.0	41.9	126	97.4	79.9	186	143.8	118.0	246	190.2	156.1
7	05.4	04.4	67	51.8	42.5	127	98.2	80.6	187	144.5	118.6	247	190.9	156.7
8	06.2	05.1	68	52.6	43.1	128	98.9	81.2	188	145.3	119.3	248	191.7	157.3
9	07.0	05.7	69	53.3	43.8	129	99.7	81.8	189	146.1	119.9	249	192.5	158.0
10	07.7	06.3	70	54.1	44.4	130	100.5	82.5	190	146.9	120.5	250	193.3	158.6
11	08.5	07.0	71	54.9	45.0	131	101.3	83.1	191	147.6	121.2	251	194.0	159.2
12	09.3	07.6	72	55.7	45.7	132	102.0	83.7	192	148.4	121.8	252	194.8	159.9
13	10.1	08.2	73	56.4	46.3	133	102.8	84.4	193	149.2	122.4	253	195.6	160.5
14	10.8	08.9	74	57.2	46.9	134	103.6	85.0	194	150.0	123.1	254	196.3	161.1
15	11.6	09.5	75	58.0	47.6	135	104.4	85.6	195	150.7	123.7	255	197.1	161.8
16	12.4	10.1	76	58.7	48.2	136	105.1	86.3	196	151.5	124.3	256	197.9	162.4
17	13.1	10.8	77	59.5	48.8	137	105.9	86.9	197	152.3	125.0	257	198.7	163.0
18	13.9	11.4	78	60.3	49.5	138	106.7	87.5	198	153.1	125.6	258	199.4	163.7
19	14.7	12.0	79	61.1	50.1	139	107.4	88.2	199	153.8	126.2	259	200.2	164.3
20	15.5	12.7	80	61.8	50.7	140	108.2	88.8	200	154.6	126.9	260	201.0	164.9
21	16.2	13.3	81	62.6	51.4	141	109.0	89.4	201	155.4	127.5	261	201.8	165.6
22	17.0	14.0	82	63.4	52.0	142	109.8	90.1	202	156.1	128.1	262	202.5	166.2
23	17.8	14.6	83	64.2	52.7	143	110.5	90.7	203	156.9	128.8	263	203.3	166.8
24	18.5	15.2	84	64.9	53.3	144	111.3	91.3	204	157.7	129.4	264	204.1	167.5
25	19.3	15.9	85	65.7	53.9	145	112.1	92.0	205	158.5	130.0	265	204.8	168.1
26	20.1	16.5	86	66.5	54.6	146	112.9	92.6	206	159.2	130.7	266	205.6	168.7
27	20.9	17.1	87	67.3	55.2	147	113.6	93.3	207	160.0	131.3	267	206.4	169.4
28	21.6	17.8	88	68.0	55.8	148	114.4	93.9	208	160.8	132.0	268	207.2	170.0
29	22.4	18.4	89	68.8	56.5	149	115.2	94.5	209	161.6	132.6	269	207.9	170.6
30	23.2	19.0	90	69.6	57.1	150	115.9	95.2	210	162.3	133.2	270	208.7	171.3
31	24.0	19.7	91	70.3	57.7	151	116.7	95.8	211	163.1	133.9	271	209.5	171.9
32	24.7	20.3	92	71.1	58.4	152	117.5	96.4	212	163.9	134.5	272	210.3	172.6
33	25.5	20.9	93	71.9	59.0	153	118.3	97.1	213	164.6	135.1	273	211.0	173.2
34	26.3	21.6	94	72.7	59.6	154	119.0	97.7	214	165.4	135.8	274	211.8	173.8
35	27.1	22.2	95	73.4	60.3	155	119.8	98.3	215	166.2	136.4	275	212.6	174.5
36	27.8	22.8	96	74.2	60.9	156	120.6	99.0	216	167.0	137.0	276	213.3	175.1
37	28.6	23.5	97	75.0	61.5	157	121.4	99.6	217	167.7	137.7	277	214.1	175.7
38	29.4	24.1	98	75.7	62.2	158	122.1	100.2	218	168.5	138.3	278	214.9	176.4
39	30.1	24.7	99	76.5	62.8	159	122.9	100.9	219	169.3	138.9	279	215.7	177.0
40	30.9	25.4	100	77.3	63.4	160	123.7	101.5	220	170.1	139.6	280	216.4	177.6
41	31.7	26.0	101	78.1	64.1	161	124.4	102.1	221	170.8	140.2	281	217.2	178.3
42	32.5	26.6	102	78.8	64.7	162	125.2	102.8	222	171.6	140.8	282	218.0	178.9
43	33.2	27.3	103	79.6	65.3	163	126.0	103.4	223	172.4	141.5	283	218.8	179.5
44	34.0	27.9	104	80.4	66.0	164	126.8	104.0	224	173.1	142.1	284	219.5	180.2
45	34.8	28.5	105	81.2	66.6	165	127.5	104.7	225	173.9	142.7	285	220.3	180.8
46	35.6	29.2	106	81.9	67.2	166	128.3	105.3	226	174.7	143.4	286	221.1	181.4
47	36.3	29.8	107	82.7	67.9	167	129.1	105.9	227	175.5	144.0	287	221.8	182.1
48	37.1	30.4	108	83.5	68.5	168	129.9	106.6	228	176.2	144.6	288	222.6	182.7
49	37.9	31.1	109	84.3	69.1	169	130.6	107.2	229	177.0	145.3	289	223.4	183.3
50	38.6	31.7	110	85.0	69.8	170	131.4	107.8	230	177.8	145.9	290	224.2	184.0
51	39.4	32.3	111	85.8	70.4	171	132.2	108.5	231	178.6	146.5	291	224.9	184.6
52	40.2	33.0	112	86.6	71.0	172	133.0	109.1	232	179.3	147.2	292	225.7	185.2
53	41.0	33.6	113	87.3	71.7	173	133.7	109.7	233	180.1	147.8	293	226.5	185.9
54	41.7	34.3	114	88.1	72.3	174	134.5	110.4	234	180.9	148.4	294	227.3	186.5
55	42.5	34.9	115	88.9	73.0	175	135.3	111.0	235	181.7	149.1	295	228.0	187.1
56	43.3	35.5	116	89.7	73.6	176	136.0	111.6	236	182.4	149.7	296	228.8	187.8
57	44.1	36.2	117	90.4	74.2	177	136.8	112.3	237	183.2	150.3	297	229.6	188.4
58	44.8	36.8	118	91.2	74.9	178	137.6	112.9	238	184.0	151.0	298	230.4	189.0
59	45.6	37.4	119	92.0	75.5	179	138.4	113.6	239	184.7	151.6	299	231.1	189.7
60	46.4	38.1	120	92.8	76.1	180	139.1	114.2	240	185.5	152.3	300	231.9	190.3
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 4½ Points.

TABLE I. Difference of Latitude and Departure for 3¾ Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	45.2	41.0	121	89.6	81.3	181	134.1	121.5	241	178.6	161.8
2	01.5	01.3	62	45.9	41.6	122	90.4	81.9	182	134.8	122.2	242	179.3	162.5
3	02.2	02.0	63	46.7	42.3	123	91.1	82.6	183	135.6	122.9	243	180.0	163.2
4	03.0	02.7	64	47.4	43.0	124	91.9	83.3	184	136.3	123.6	244	180.8	163.8
5	03.7	03.4	65	48.2	43.6	125	92.6	83.9	185	137.1	124.2	245	181.5	164.5
6	04.4	04.0	66	48.9	44.3	126	93.4	84.6	186	137.8	124.9	246	182.3	165.2
7	05.2	04.7	67	49.6	45.0	127	94.1	85.3	187	138.6	125.6	247	183.0	165.9
8	05.9	05.4	68	50.4	45.7	128	94.8	86.0	188	139.3	126.2	248	183.8	166.5
9	06.7	06.0	69	51.1	46.3	129	95.6	86.6	189	140.0	126.9	249	184.5	167.2
10	07.4	06.7	70	51.9	47.0	130	96.3	87.3	190	140.8	127.6	250	185.2	167.9
11	08.2	07.4	71	52.6	47.7	131	97.1	88.0	191	141.5	128.3	251	186.0	168.5
12	08.9	08.1	72	53.3	48.3	132	97.8	88.6	192	142.3	128.9	252	186.7	169.2
13	09.6	08.7	73	54.1	49.0	133	98.5	89.3	193	143.0	129.6	253	187.5	169.9
14	10.4	09.4	74	54.8	49.7	134	99.3	90.0	194	143.7	130.3	254	188.2	170.6
15	11.1	10.1	75	55.6	50.4	135	100.0	90.7	195	144.5	130.9	255	188.9	171.2
16	11.9	10.7	76	56.3	51.0	136	100.8	91.3	196	145.2	131.6	256	189.7	171.9
17	12.6	11.4	77	57.0	51.7	137	101.5	92.0	197	146.0	132.3	257	190.4	172.6
18	13.3	12.1	78	57.8	52.4	138	102.2	92.7	198	146.7	133.0	258	191.2	173.2
19	14.1	12.8	79	58.5	53.0	139	103.0	93.3	199	147.4	133.6	259	191.9	173.9
20	14.8	13.4	80	59.3	53.7	140	103.7	94.0	200	148.2	134.3	260	192.6	174.6
21	15.6	14.1	81	60.0	54.4	141	104.5	94.7	201	148.9	135.0	261	193.4	175.3
22	16.3	14.8	82	60.8	55.1	142	105.2	95.4	202	149.7	135.6	262	194.1	175.9
23	17.0	15.4	83	61.5	55.7	143	106.0	96.0	203	150.4	136.3	263	194.9	176.6
24	17.8	16.1	84	62.2	56.4	144	106.7	96.7	204	151.1	137.0	264	195.6	177.3
25	18.5	16.8	85	63.0	57.1	145	107.4	97.4	205	151.9	137.7	265	196.3	178.0
26	19.3	17.5	86	63.7	57.7	146	108.2	98.0	206	152.6	138.3	266	197.1	178.6
27	20.0	18.1	87	64.5	58.4	147	108.9	98.7	207	153.4	139.9	267	197.8	179.3
28	20.7	18.8	88	65.2	59.1	148	109.7	99.4	208	154.1	139.7	268	198.6	180.0
29	21.5	19.5	89	65.9	59.8	149	110.4	100.1	209	154.9	140.3	269	199.3	180.6
30	22.2	20.1	90	66.7	60.4	150	111.1	100.7	210	155.6	141.0	270	200.1	181.3
31	23.0	20.8	91	67.4	61.1	151	111.9	101.4	211	156.3	141.7	271	200.8	182.0
32	23.7	21.5	92	68.2	61.8	152	112.6	102.1	212	157.1	142.4	272	201.5	182.7
33	24.4	22.2	93	68.9	62.4	153	113.4	102.7	213	157.8	143.0	273	202.3	183.3
34	25.2	22.8	94	69.6	63.1	154	114.1	103.4	214	158.6	143.7	274	203.0	184.0
35	25.9	23.5	95	70.4	63.8	155	114.8	104.1	215	159.3	144.4	275	203.8	184.7
36	26.7	24.2	96	71.1	64.5	156	115.6	104.8	216	160.0	145.0	276	204.5	185.3
37	27.4	24.8	97	71.9	65.1	157	116.3	105.4	217	160.8	145.7	277	205.2	186.0
38	28.2	25.5	98	72.6	65.8	158	117.1	106.1	218	161.5	146.4	278	206.0	186.7
39	28.9	26.2	99	73.3	66.5	159	117.8	106.8	219	162.3	147.1	279	206.7	187.4
40	29.6	26.9	100	74.1	67.2	160	118.5	107.4	220	163.0	147.7	280	207.5	188.0
41	30.4	27.5	101	74.8	67.8	161	119.3	108.1	221	163.7	148.4	281	208.2	188.7
42	31.1	28.2	102	75.6	68.5	162	120.0	108.8	222	164.5	149.1	282	208.9	189.4
43	31.9	28.9	103	76.3	69.2	163	120.8	109.5	223	165.2	149.7	283	209.7	190.0
44	32.6	29.5	104	77.1	69.8	164	121.5	110.1	224	166.0	150.4	284	210.4	190.7
45	33.3	30.2	105	77.8	70.5	165	122.3	110.8	225	166.7	151.1	285	211.2	191.4
46	34.1	30.9	106	78.5	71.2	166	123.0	111.5	226	167.4	151.8	286	211.9	192.1
47	34.8	31.6	107	79.3	71.8	167	123.7	112.1	227	168.2	152.4	287	212.6	192.7
48	35.6	32.2	108	80.0	72.5	168	124.5	112.8	228	168.9	153.1	288	213.4	193.4
49	36.3	32.9	109	80.8	73.2	169	125.2	113.5	229	169.7	153.8	289	214.1	194.1
50	37.0	33.6	110	81.5	73.9	170	126.0	114.2	230	170.4	154.5	290	214.9	194.7
51	37.8	34.2	111	82.2	74.5	171	126.7	114.8	231	171.2	155.1	291	215.6	195.4
52	38.5	34.9	112	83.0	75.2	172	127.4	115.5	232	171.9	155.8	292	216.4	196.1
53	39.3	35.6	113	83.7	75.9	173	128.2	116.2	233	172.6	156.5	293	217.1	196.8
54	40.0	36.3	114	84.5	76.5	174	128.9	116.8	234	173.4	157.1	294	217.8	197.4
55	40.7	36.9	115	85.2	77.2	175	129.7	117.5	235	174.1	157.8	295	218.6	198.1
56	41.5	37.6	116	85.9	77.9	176	130.4	118.2	236	174.9	158.5	296	219.3	198.8
57	42.2	38.3	117	86.7	78.6	177	131.1	118.9	237	175.6	159.1	297	220.1	199.4
58	43.0	38.9	118	87.4	79.2	178	131.9	119.5	238	176.3	159.8	298	220.8	200.1
59	43.7	39.6	119	88.2	79.9	179	132.6	120.2	239	177.1	160.5	299	221.5	200.8
60	44.5	40.3	120	88.9	80.6	180	133.4	120.9	240	177.8	161.2	300	222.3	201.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 4¼ Points.

TABLE I. Difference of Latitude and Departure for 4 Points.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	122	86.3	86.3	182	128.7	128.7	242	171.1	171.1
3	02.1	02.1	63	44.5	44.5	123	87.0	87.0	183	129.4	129.4	243	171.8	171.8
4	02.8	02.8	64	45.3	45.3	124	87.7	87.7	184	130.1	130.1	244	172.5	172.5
5	03.5	03.5	65	46.0	46.0	125	88.4	88.4	185	130.8	130.8	245	173.2	173.2
6	04.2	04.2	66	46.7	46.7	126	89.1	89.1	186	131.5	131.5	246	173.9	173.9
7	04.9	04.9	67	47.4	47.4	127	89.8	89.8	187	132.2	132.2	247	174.7	174.7
8	05.7	05.7	68	48.1	48.1	128	90.5	90.5	188	132.9	132.9	248	175.4	175.4
9	06.4	06.4	69	48.8	48.8	129	91.2	91.2	189	133.6	133.6	249	176.1	176.1
10	07.1	07.1	70	49.5	49.5	130	91.9	91.9	190	134.3	134.3	250	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	92.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	132	93.3	93.3	192	135.8	135.8	252	178.2	178.2
13	09.2	09.2	73	51.6	51.6	133	94.0	94.0	193	136.5	136.5	253	178.9	178.9
14	09.9	09.9	74	52.3	52.3	134	94.8	94.8	194	137.2	137.2	254	179.6	179.6
15	10.6	10.6	75	53.0	53.0	135	95.5	95.5	195	137.9	137.9	255	180.3	180.3
16	11.3	11.3	76	53.7	53.7	136	96.2	96.2	196	138.6	138.6	256	181.0	181.0
17	12.0	12.0	77	54.4	54.4	137	96.9	96.9	197	139.3	139.3	257	181.7	181.7
18	12.7	12.7	78	55.2	55.2	138	97.6	97.6	198	140.0	140.0	258	182.4	182.4
19	13.4	13.4	79	55.9	55.9	139	98.3	98.3	199	140.7	140.7	259	183.1	183.1
20	14.1	14.1	80	56.6	56.6	140	99.0	99.0	200	141.4	141.4	260	183.8	183.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.6	184.6
22	15.6	15.6	82	58.0	58.0	142	100.4	100.4	202	142.8	142.8	262	185.3	185.3
23	16.3	16.3	83	58.7	58.7	143	101.1	101.1	203	143.5	143.5	263	186.0	186.0
24	17.0	17.0	84	59.4	59.4	144	101.8	101.8	204	144.2	144.2	264	186.7	186.7
25	17.7	17.7	85	60.1	60.1	145	102.5	102.5	205	145.0	145.0	265	187.4	187.4
26	18.4	18.4	86	60.8	60.8	146	103.2	103.2	206	145.7	145.7	266	188.1	188.1
27	19.1	19.1	87	61.5	61.5	147	103.9	103.9	207	146.4	146.4	267	188.8	188.8
28	19.8	19.8	88	62.2	62.2	148	104.7	104.7	208	147.1	147.1	268	189.5	189.5
29	20.5	20.5	89	62.9	62.9	149	105.4	105.4	209	147.8	147.8	269	190.2	190.2
30	21.2	21.2	90	63.6	63.6	150	106.1	106.1	210	148.5	148.5	270	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	152	107.5	107.5	212	149.9	149.9	272	192.3	192.3
33	23.3	23.3	93	65.8	65.8	153	108.2	108.2	213	150.6	150.6	273	193.0	193.0
34	24.0	24.0	94	66.5	66.5	154	108.9	108.9	214	151.3	151.3	274	193.7	193.7
35	24.7	24.7	95	67.2	67.2	155	109.6	109.6	215	152.0	152.0	275	194.5	194.5
36	25.5	25.5	96	67.9	67.9	156	110.3	110.3	216	152.7	152.7	276	195.2	195.2
37	26.2	26.2	97	68.6	68.6	157	111.0	111.0	217	153.4	153.4	277	195.9	195.9
38	26.9	26.9	98	69.3	69.3	158	111.7	111.7	218	154.1	154.1	278	196.6	196.6
39	27.6	27.6	99	70.0	70.0	159	112.4	112.4	219	154.9	154.9	279	197.3	197.3
40	28.3	28.3	100	70.7	70.7	160	113.1	113.1	220	155.6	155.6	280	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	102	72.1	72.1	162	114.5	114.5	222	157.0	157.0	282	199.4	199.4
43	30.4	30.4	103	72.8	72.8	163	115.3	115.3	223	157.7	157.7	283	200.1	200.1
44	31.1	31.1	104	73.5	73.5	164	116.0	116.0	224	158.4	158.4	284	200.8	200.8
45	31.8	31.8	105	74.2	74.2	165	116.7	116.7	225	159.1	159.1	285	201.5	201.5
46	32.5	32.5	106	75.0	75.0	166	117.4	117.4	226	159.8	159.8	286	202.2	202.2
47	33.2	33.2	107	75.7	75.7	167	118.1	118.1	227	160.5	160.5	287	202.9	202.9
48	33.9	33.9	108	76.4	76.4	168	118.8	118.8	228	161.2	161.2	288	203.6	203.6
49	34.6	34.6	109	77.1	77.1	169	119.5	119.5	229	161.9	161.9	289	204.3	204.3
50	35.4	35.4	110	77.8	77.8	170	120.2	120.2	230	162.6	162.6	290	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	112	79.2	79.2	172	121.6	121.6	232	164.0	164.0	292	206.5	206.5
53	37.5	37.5	113	79.9	79.9	173	122.3	122.3	233	164.8	164.8	293	207.2	207.2
54	38.2	38.2	114	80.6	80.6	174	123.0	123.0	234	165.5	165.5	294	207.9	207.9
55	38.9	38.9	115	81.3	81.3	175	123.7	123.7	235	166.2	166.2	295	208.6	208.6
56	39.6	39.6	116	82.0	82.0	176	124.4	124.4	236	166.9	166.9	296	209.3	209.3
57	40.3	40.3	117	82.7	82.7	177	125.2	125.2	237	167.6	167.6	297	210.0	210.0
58	41.0	41.0	118	83.4	83.4	178	125.9	125.9	238	168.3	168.3	298	210.7	210.7
59	41.7	41.7	119	84.1	84.1	179	126.6	126.6	239	169.0	169.0	299	211.4	211.4
60	42.4	42.4	120	84.8	84.8	180	127.3	127.3	240	169.7	169.7	300	212.1	212.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

TABLE II. Difference of Latitude and Departure for 1 Degree.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.0	61	61.0	01.1	121	121.0	02.1	181	181.0	03.2	241	241.0	04.2
2	02.0	00.0	62	62.0	01.1	122	122.0	02.1	182	182.0	03.2	242	242.0	04.2
3	03.0	00.1	63	63.0	01.1	123	123.0	02.1	183	183.0	03.2	243	243.0	04.2
4	04.0	00.1	64	64.0	01.1	124	124.0	02.2	184	184.0	03.2	244	244.0	04.3
5	05.0	00.1	65	65.0	01.1	125	125.0	02.2	185	185.0	03.2	245	245.0	04.3
6	06.0	00.1	66	66.0	01.2	126	126.0	02.2	186	186.0	03.2	246	246.0	04.3
7	07.0	00.1	67	67.0	01.2	127	127.0	02.2	187	187.0	03.3	247	247.0	04.3
8	08.0	00.1	68	68.0	01.2	128	128.0	02.2	188	188.0	03.3	248	248.0	04.3
9	09.0	00.2	69	69.0	01.2	129	129.0	02.3	189	189.0	03.3	249	249.0	04.3
10	10.0	00.2	70	70.0	01.2	130	130.0	00.3	190	190.0	03.3	250	250.0	04.4
11	11.0	00.2	71	71.0	01.2	131	131.0	02.3	191	191.0	03.3	251	251.0	04.4
12	12.0	00.2	72	72.0	01.3	132	132·0	02.3	192	192.0	03.4	252	252.0	04.4
13	13.0	00.2	73	73.0	01.3	133	133.0	02.3	193	193.0	03.4	253	253.0	04.4
14	14.0	00.2	74	74.0	01.3	134	134.0	02.3	194	194.0	03.4	254	254.0	04.4
15	15.0	00.3	75	75.0	01.3	135	135.0	02.4	195	195.0	03.4	255	255.0	04.5
16	16.0	00.3	76	76.0	01.3	136	136.0	02.4	196	196.0	03.4	256	256.0	04.5
17	17.0	00.3	77	77.0	01.3	137	137.0	02.4	197	197.0	03.4	257	257.0	04.5
18	18.0	00.3	78	78.0	01.4	138	138.0	02.4	198	198.0	03.5	258	258.0	04.5
19	19.0	00.3	79	79.0	01.4	139	139.0	02.4	199	199.0	03.5	259	259.0	04.5
20	20.0	00.3	80	80.0	01.4	140	140.0	02.4	200	200.0	03.5	260	260.0	04.5
21	21.0	00.4	81	81.0	01.4	141	141.0	02.5	201	201.0	03.5	261	261.0	04.6
22	22.0	00.4	82	82.0	01.4	142	142.0	02.5	202	202.0	03.5	262	262.0	04.6
23	23.0	00.4	83	83.0	01.4	143	143.0	02.5	203	203.0	03.5	263	263.0	04.6
24	24.0	00.4	84	84.0	01.5	144	144.0	02.5	204	204.0	03.6	264	264.0	04.6
25	25.0	00.4	85	85.0	01.5	145	145.0	02.5	205	205.0	03.6	265	265.0	04.6
26	26.0	00.5	86	86.0	01.5	146	146.0	02.5	206	206.0	03.6	266	266.0	04.6
27	27.0	00.5	87	87.0	01.5	147	147.0	02.6	207	207.0	03.6	267	267.0	04.7
28	28.0	00.5	88	88.0	01.5	148	148.0	02.6	208	208.0	03.6	268	268.0	04.7
29	29.0	00.5	89	89.0	01.6	149	149.0	02.6	209	209.0	03.6	269	269.0	04.7
30	30.0	00.5	90	90.0	01.6	150	150.0	02.6	210	210.0	03.7	270	270.0	04.7
31	31.0	00.5	91	91.0	01.6	151	151.0	02.6	211	211.0	03.7	271	271.0	04.7
32	32.0	00.6	92	92.0	01.6	152	152.0	02.7	212	212.0	03.7	272	272.0	04.7
33	33.0	00.6	93	93.0	01.6	153	153.0	02.7	213	213.0	03.7	273	273.0	04.8
34	34.0	00.6	94	94.0	01.6	154	154.0	02.7	214	214.0	03.7	274	274.0	04.8
35	35.0	00.6	95	95.0	01.7	155	155.0	02.7	215	215.0	03.8	275	275.0	04.8
36	36.0	00.6	96	96·0	01.7	156	166.0	02.7	216	216.0	03.8	276	276.0	04.8
37	37.0	00.6	97	97.0	01.7	157	157.0	02.7	217	217.0	03.8	277	277.0	04.8
38	38.0	00.7	98	98.0	01.7	158	158.0	02.8	218	218.0	03.8	278	278.0	04.9
39	39.0	00.7	99	99.0	01.7	159	159.0	02.8	219	219.0	03.8	279	279.0	04.9
40	40.0	00.7	100	100.0	01.7	160	160.0	02.8	220	220.0	03.8	280	280.0	04.9
41	41.0	00.7	101	101.0	01.8	161	161.0	02.8	221	221.0	03.9	281	281.0	04.9
42	42.0	00.7	102	102.0	01.8	162	162.0	02.8	222	222.0	03.9	282	282.0	04.9
43	43.0	00.8	103	103.0	01.8	163	163.0	02.8	223	223.0	03.9	283	283.0	04.9
44	44.0	00.8	104	104.0	01.8	164	164.0	02.9	224	224.0	03.9	284	284.0	05.0
45	45.0	00.8	105	105.0	01.8	165	165.0	02.9	225	225.0	03.9	285	285.0	05.0
46	46.0	00.8	106	106.0	01.8	166	166.0	02.9	226	226.0	03.9	286	286.0	05.0
47	47.0	00.8	107	107.0	01.9	167	167.0	02.9	227	227.0	04.0	287	287.0	05.0
48	48.0	00.8	108	108.0	01.9	168	168.0	02.9	228	228.0	04.0	288	288.0	05.0
49	49.0	00.9	109	109.0	01.9	169	169.0	02.9	229	229.0	04.0	289	289.0	05.0
50	50.0	00.9	110	110.0	01.9	170	170.0	03.0	230	230.0	04.0	290	290.0	05.1
51	51.0	00.9	111	111.0	01.9	171	171.0	03.0	231	231.0	04.0	291	291.0	05.1
52	52.0	00.9	112	112.0	02.0	172	172.0	03.0	232	232.0	04.0	292	292.0	05.1
53	53.0	00.9	113	113.0	02.0	173	173.0	03.0	233	233.0	04.1	293	293.0	05.1
54	54.0	60.9	114	114.0	02.0	174	174.0	03.0	234	234.0	04.1	294	294.0	05.1
55	55.0	01.0	115	115.0	02.0	175	175.0	03.1	235	235.0	04.1	295	295.0	05.1
56	56.0	01.0	116	116.0	02.0	176	176.0	03.1	236	236.0	04.1	296	296.0	05.2
57	57.0	01.0	117	117.0	02.0	177	177.0	03.1	237	237.0	04.1	297	297.0	05.2
58	58.0	01.0	118	118.0	02.1	178	178.0	03.1	238	238.0	04.2	298	298.0	05.2
59	59.0	01.0	119	119.0	02.1	179	179.0	03.1	239	239.0	04.2	299	299.0	05.2
60	60.0	01.0	120	120.0	02.1	180	170.0	03.1	240	240.0	04.2	300	300.0	05.2
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 89 Degrees.

TABLE II. Difference of Latitude and Departure for 2 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.0	61	61.0	02.1	121	120.9	04.2	181	180.9	06.3	241	240.9	08.4
2	02.0	00.1	62	62.0	02.2	122	121.9	04.3	182	181.9	06.4	242	241.9	08.4
3	03.0	00.1	63	63.0	02.2	123	122.9	04.3	183	182.9	06.4	243	242.9	08.5
4	04.0	00.1	64	64.0	02.2	124	123.9	04.3	184	183.9	06.4	244	243.9	08.5
5	05.0	00.2	65	65.0	02.3	125	124.9	04.4	185	184.9	06.5	245	244.9	08.6
6	06.0	00.2	66	66.0	02.3	126	125.9	04.4	186	185.9	06.5	246	245.9	08.6
7	07.0	00.2	67	67.0	02.3	127	126.9	04.4	187	186.9	06.5	247	246.8	08.6
8	08.0	00.3	68	68.0	02.4	128	127.9	04.5	188	187.9	06.6	248	247.8	08.7
9	09.0	00.3	69	69.0	02.4	129	128.9	04.5	189	188.9	06.6	249	248.8	08.7
10	10.0	00.3	70	70.0	02.4	130	129.9	04.5	190	189.9	06.6	250	249.8	08.7
11	11.0	00.4	71	71.0	02.5	131	130.9	04.6	191	190.9	06.7	251	250.8	08.8
12	12.0	00.4	72	72.0	02.5	132	131.9	04.6	192	191.9	06.7	252	251.8	08.8
13	13.0	00.5	73	73.0	02.5	133	132.9	04.6	193	192.9	06.7	253	252.8	08.8
14	14.0	00.5	74	74.0	02.6	134	133.9	04.7	194	193.9	06.8	254	253.8	08.9
15	15.0	00.5	75	75.0	02.6	135	134.9	04.7	195	194.9	06.8	255	254.8	08.9
16	16.0	00.6	76	76.0	02.7	136	135.9	04.7	196	195.9	06.8	256	255.8	08.9
17	17.0	00.6	77	77.0	02.7	137	136.9	04.8	197	196.9	06.9	257	256.8	09.0
18	18.0	00.6	78	78.0	02.7	138	137.9	04.8	198	197.9	06.9	258	257.8	09.0
19	19.0	00.7	79	79.0	02.8	139	138.9	04.9	199	198.9	06.9	259	258.8	09.0
20	20.0	00.7	80	80.0	02.8	140	139.9	04.9	200	199.9	07.0	260	259.8	09.1
21	21.0	00.7	81	81.0	02.8	141	140.9	04.9	201	200.9	07.0	261	260.8	09.1
22	22.0	00.8	82	82.0	02.9	142	141.9	05.0	202	201.9	07.0	262	261.8	09.1
23	23.0	00.8	83	82.9	02.9	143	142.9	05.0	203	202.9	07.1	263	262.8	09.2
24	24.0	00.8	84	83.9	02.9	144	143.9	05.0	204	203.9	07.1	264	263.8	09.2
25	25.0	00.9	85	84.9	03.0	145	144.9	05.1	205	204.9	07.2	265	264.8	09.2
26	26.0	00.9	86	85.9	03.0	146	145.9	05.1	206	205.9	07.2	266	265.8	09.3
27	27.0	00.9	87	86.9	03.0	147	146.9	05.1	207	206.9	07.2	267	266.8	09.3
28	28.0	01.0	88	87.9	03.1	148	147.9	05.2	208	207.9	07.3	268	267.8	09.4
29	29.0	01.0	89	88.9	03.1	149	148.9	05.2	209	208.9	07.3	269	268.8	09.4
30	30.0	01.0	90	89.9	03.1	150	149.9	05.2	210	209.9	07.3	270	269.8	09.4
31	31.0	01.1	91	90.9	03.2	151	150.9	05.3	211	210.9	07.4	271	270.8	09.5
32	32.0	01.1	92	91.9	03.2	152	151.9	05.3	212	211.9	07.4	272	271.8	09.5
33	33.0	01.2	93	92.9	03.2	153	152.9	05.3	213	212.9	07.4	273	272.8	09.5
34	34.0	01.2	94	93.9	03.3	154	153.9	05.4	214	213.9	07.5	274	273.8	09.6
35	35.0	01.2	95	94.9	03.3	155	154.9	05.4	215	214.9	07.5	275	274.8	09.6
36	36.0	01.3	96	95.9	03.4	156	155.9	05.4	216	215.9	07.5	276	275.8	09.6
37	37.0	01.3	97	96.9	03.4	157	156.9	05.5	217	216.9	07.6	277	276.8	09.7
38	38.0	01.3	98	97.9	03.4	158	157.9	05.5	218	217.9	07.6	278	277.8	09.7
39	39.0	01.4	99	98.9	03.5	159	158.9	05.5	219	218.9	07.6	279	278.8	09.7
40	40.0	01.4	100	99.9	03.5	160	159.9	05.6	220	219.9	07.7	280	279.8	09.8
41	41.0	01.4	101	100.9	03.5	161	160.9	05.6	221	220.9	07.7	281	280.8	09.8
42	42.0	01.5	102	101.9	03.6	162	161.9	05.7	222	221.9	07.7	282	281.8	09.8
43	43.0	01.5	103	102.9	03.6	163	162.9	05.7	223	222.9	07.8	283	282.8	09.9
44	44.0	01.5	104	103.9	03.6	164	163.9	05.7	224	223.9	07.8	284	283.8	09.9
45	45.0	01.6	105	104.9	03.7	165	164.9	05.8	225	224.9	07.9	285	284.8	09.9
46	46.0	01.6	106	105.9	03.7	166	165.9	05.8	226	225.9	07.9	286	285.8	10.0
47	47.0	01.6	107	106.9	03.7	167	166.9	05.8	227	226.9	07.9	287	286.8	10.0
48	48.0	01.7	108	107.9	03.8	168	167.9	05.9	228	227.9	08.0	288	287.8	10.1
49	49.0	01.7	109	108.9	03.8	169	168.9	05.9	229	228.9	08.0	289	288.8	10.1
50	50.0	01.7	110	109.9	03.8	170	169.9	05.9	230	229.9	08.0	290	289.8	10.1
51	51.0	01.8	111	110.9	03.9	171	170.9	06.0	231	230.9	08.1	291	290.8	10.2
52	52.0	01.8	112	111.9	03.9	172	171.9	06.0	232	231.9	08.1	292	291.8	10.2
53	53.0	01.8	113	112.9	03.9	173	172.9	06.0	233	232.9	08.1	293	292.8	10.2
54	54.0	01.9	114	113.9	04.0	174	173.9	06.1	234	233.9	08.2	294	293.8	10.3
55	55.0	01.9	115	114.9	04.0	175	174.9	06.1	235	234.9	08.2	295	294.8	10.3
56	56.0	02.0	116	115.9	04.0	176	175.9	06.1	236	235.9	08.2	296	295.8	10.3
57	57.0	02.0	117	116.9	04.1	177	176.9	06.2	237	236.9	08.3	297	296.8	10.4
58	58.0	02.0	118	117.9	04.1	178	177.9	06.2	238	237.9	08.3	298	297·8	10.4
59	59.0	02.1	119	118.9	04.2	179	178.9	06.2	239	238.9	08.3	299	298.8	10.4
60	60.0	02.1	120	119.9	04.2	180	179.9	06.3	240	239.9	08.4	300	299.8	10.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 88 Degrees.

TABLE II. Difference of Latitude and Departure for 3 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.9	03.2	121	120.8	06.3	181	180.8	09.5	241	240.7	12.6
2	02.0	00.1	62	61.9	03.2	122	121.8	06.4	182	181.8	09.5	242	241.7	12.7
3	03.0	00.2	63	62.9	03.3	123	122.8	06.4	183	182.7	09.6	243	242.7	12.7
4	04.0	00.2	64	63.9	03.3	124	123.8	06.5	184	183.7	09.6	244	243.7	12.8
5	05.0	00.3	65	64.9	03.4	125	124.8	06.5	185	184.7	09.7	245	244.7	12.8
6	06.0	00.3	66	65.9	03.5	126	125.8	06.6	186	185.7	09.7	246	245.7	12.9
7	07.0	00.4	67	66.9	03.5	127	126.8	06.6	187	186.7	09.8	247	246.7	12.9
8	08.0	00.4	68	67.9	03.6	128	127.8	06.7	188	187.7	09.8	248	247.7	13.0
9	09.0	00.5	69	68.9	03.6	129	128.8	06.8	189	188.7	09.9	249	248.7	13.0
10	10.0	00.5	70	69.9	03.7	130	129.8	06.8	190	189.7	09.9	250	249.7	13.1
11	11.0	00.6	71	70.9	03.7	131	130.8	06.9	191	190.7	10.0	251	250.7	13.1
12	12.0	00.6	72	71.9	03.8	132	131.8	06.9	192	191.7	10.0	252	251.7	13.2
13	13.0	00.7	73	72,9	03.8	133	132.8	07.0	193	192.7	10.1	253	252.7	13.2
14	14.0	00.7	74	73.9	03.9	134	133.8	07.0	194	193.7	10.2	254	253.7	13.3
15	15.0	00.8	75	74.9	03.9	135	134.8	07.1	195	194.7	10.2	255	254.7	13.3
16	16.0	00.8	76	75.9	04.0	136	135.8	07.1	196	195.7	10.3	256	255.6	13.4
17	17.0	00.9	77	76.9	04.0	137	136.8	07.2	197	196.7	10.3	257	256.6	13.5
18	18.0	00.9	78	77.9	04.1	138	137.8	07.2	198	197.7	10.4	258	257.6	13.5
19	19.0	01.0	79	78.9	04.1	139	138.8	07.3	199	198.7	10.4	259	258.6	13.6
20	20.0	01.0	80	79.9	04.2	140	139.8	07.3	200	199.7	10.5	260	259.6	13.6
21	21.0	01.1	81	80.9	04.2	141	140.8	07.4	201	200.7	10.5	261	260.6	13.7
22	22.0	01.2	82	81.9	04.3	142	141.8	07.4	202	201.7	10.6	262	261.6	13.7
23	23.0	01.2	83	82.9	04.3	143	142.8	07.5	203	202.7	10.6	263	262.6	13.8
24	24.0	01.3	84	83.9	04.4	144	143.8	07.5	204	203.7	10.7	264	263.6	13.8
25	25.0	01.3	85	84.9	04.4	145	144.8	07.6	205	204.7	10.7	265	264.6	13.9
26	26.0	01.4	86	85.9	04.5	146	145.8	07.6	206	205.7	10.8	266	265.6	13.9
27	27.0	01.4	87	86.9	04.6	147	146.8	07.7	207	206.7	10.8	267	266.6	14.0
28	28.0	01.5	88	87.9	04.6	148	147.8	07.7	208	207.7	10.9	268	267.6	14.0
29	29.0	01.5	89	88.9	04.7	149	148.8	07.8	209	208.7	10.9	269	268.6	14.1
30	30.0	01.6	90	88.9	04.7	150	149.8	07.9	210	209.7	11.0	270	269.6	14.1
31	31.0	01.6	91	90.9	04.8	151	150.8	07.9	211	210.7	11.0	271	270.6	14.2
32	32.0	01.7	92	91.9	04.8	152	151.8	08.0	212	211.7	11.1	272	271.6	14.2
33	33.0	01.7	93	92.9	04.9	153	152.8	08.0	213	212.7	11.1	273	272.6	14.3
34	34.0	01.8	94	93.9	04.9	154	153.8	08.1	214	213.7	11.2	274	273.6	14.3
35	35.0	01.8	95	94.9	05.0	155	154.8	08.1	215	214.7	11.3	275	274.6	14.4
36	36.0	01.9	96	95.9	05.0	156	155.8	08.2	216	215.7	11.3	276	275.6	14.4
37	36.9	01.9	97	96.9	05.1	157	156.8	08.2	217	216.7	11.4	277	276.6	14.5
38	37.9	02.0	98	97.9	05.1	158	157.8	08.3	218	217.7	11.4	278	277.6	14.5
39	38.9	02.0	99	98.9	05.2	159	158.8	08.3	219	218.7	11.5	279	278.6	14.6
40	39.9	02.1	100	99.9	05.2	160	159.8	08.4	220	219.7	11.5	280	279.6	14.7
41	40.9	02.1	101	100.9	05.3	161	160.8	08.4	221	220.7	11.6	281	280.6	14.7
42	41.9	02.2	102	101.9	05.3	162	161.8	08.5	222	221.7	11.6	282	281.6	14.8
43	42.9	02.3	103	102.9	05.4	163	162.8	08.5	223	222.7	11.7	283	282.6	14.8
44	43.9	02.3	104	103.9	05.4	164	163.8	08.6	224	223.7	11.7	284	283.6	14.9
45	44.9	02.4	105	104.9	05.5	165	164.8	08.6	225	224.7	11.8	285	284.6	14.9
46	45.9	02.4	106	105.9	05.5	166	165.8	08.7	226	225.7	11.8	286	285.6	15.0
47	46.9	02.5	107	106.9	05.6	167	166.8	08.7	227	226.7	11.9	287	286.6	15.0
48	47.9	02.5	108	107.9	05.7	168	167.8	08.8	228	227.7	11.9	288	287.6	15.1
49	48.9	02.6	109	108.9	05.7	169	168.8	08.8	229	228.7	12.0	289	288.6	15.1
50	49.9	02.6	110	109.8	05.8	170	169.8	08.9	230	229.7	12.0	290	289.6	15.2
51	50.9	02.7	111	110.8	05.8	171	170.8	08.9	231	230.7	12.1	291	290.6	15.2
52	51.9	02.7	112	111.8	05.9	172	171.8	09.0	232	231.7	12.1	292	291.6	15.3
53	52.9	02.8	113	112,8	05.9	173	172.8	09.1	233	232.7	12.2	293	292.6	15.3
54	53.9	02.8	114	113.8	06.0	174	173.8	09.1	234	233.7	12.2	294	293.6	15.4
55	54.9	02.9	115	114.8	06.0	175	174.8	09.2	235	234.7	12.3	295	294.6	15.4
56	55.9	02.9	116	115.8	06.1	176	175.8	09.2	236	235.7	12.4	296	295.6	15.5
57	56.9	03.0	117	116.8	06.1	177	176.8	09.3	237	236.7	12.4	297	296.6	15.5
58	57.9	03.0	118	117.8	06.2	178	177.8	09.3	238	237.7	12.5	298	297.6	15.6
59	58.9	03.1	119	118.8	06.2	179	178.8	09.4	239	238.7	12.5	299	298.6	15.6
60	59.9	03.1	120	119.8	06.3	180	179.8	09.4	240	239.7	12.6	300	299.6	15.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 87 Degrees.

TABLE II. Difference of Latitude and Departure for 4 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep
1	01.0	00.1	61	60.9	04.3	121	120.7	08.4	181	180.6	12.6	241	240.4	16.8
2	02.0	00.1	62	61.8	04.3	122	121.7	08.5	182	181.6	12.7	242	241.4	16.9
3	03.0	00.2	63	62.8	04.4	123	122.7	08.6	183	182.6	12.8	243	242.4	17.0
4	04.0	00.3	64	63.8	04.5	124	123.7	08.6	184	183.6	12.8	244	243.4	17.0
5	05.0	00.3	65	64.8	04.5	125	124.7	08.7	185	184.5	12.9	245	244.4	17.1
6	06.0	00.4	66	65.8	04.6	126	125.7	08.8	186	185.5	13.0	246	245.4	17.2
7	07.0	00.5	67	66.8	04.7	127	126.7	08.9	187	186.5	13.0	247	246.4	17.2
8	08.0	00.6	68	67.8	04.7	128	127.7	08.9	188	187.5	13.1	248	247.4	17.3
9	09.0	00.6	69	68.8	04.8	129	128.7	08.0	189	188.5	13.2	249	248.4	17.4
10	10.0	00.7	70	69.8	04.9	130	129.7	09.1	190	189.5	13.3	250	249.4	17.4
11	11.0	00.8	71	70.8	05.0	131	130.7	09.1	191	190.5	13.3	251	250.4	17.5
12	12.0	00.8	72	71.8	05.0	132	131.7	09.2	192	191.5	13.4	252	251.4	17.6
13	13.0	00.9	73	72.8	05.1	133	132.7	09.3	193	192.5	13.5	253	252.4	17.6
14	14.0	01.0	74	73.8	05.2	134	133.7	09.3	194	193.5	13.5	254	253.4	17.7
15	15.0	01.0	75	74.8	05.2	135	134.7	09.4	195	194.5	13.6	255	254.4	17.8
16	16.0	01.1	76	75.8	05.3	136	135.7	09.5	196	195.5	13.7	356	255.4	17.9
17	17.0	01.2	77	76.8	05.4	137	136.7	09.6	197	196.5	13.7	257	256.4	17.9
18	18.0	01.3	78	77.8	05.4	138	137.7	09.6	198	197.5	13.8	258	257.4	18.0
19	19.0	01.3	79	78.8	05.5	139	138.7	09.7	199	198.5	13.9	259	258.4	18.1
20	20.0	01.4	80	79.8	05.6	140	139.7	09.8	200	199.5	14.0	260	259.4	18.1
21	20.9	01.5	81	80.8	05.7	141	140.7	09.8	201	200.5	14.0	261	260.4	18.2
22	21.9	01.5	82	81.8	05.7	142	141.7	09.9	202	201.5	14.1	262	261.4	18.3
23	22.9	01.6	83	82.8	05.8	143	142.7	10.0	203	202.5	14.2	263	262.4	18.3
24	23.9	01.7	84	83.8	05.9	144	143.6	10.0	204	203.5	14.2	264	263.4	18.4
25	24.9	01.7	85	84.8	05.9	145	144.6	10.1	205	204.5	14.3	265	264.4	18.5
26	25.9	01.8	86	85.8	06.0	146	145.6	10.2	206	205.5	14.4	266	265.4	18.6
27	26.9	01.9	87	86.8	06.1	147	146.6	10.3	207	206.5	14.4	267	266.3	18.6
28	27.9	02.0	88	87.8	06.1	148	147.6	10.3	208	207.5	14.5	268	267.3	18.7
29	28.9	02.0	89	88.8	06.2	149	148.6	10.4	209	208.5	14.6	269	268.3	18.8
30	29.9	02.1	90	89.8	06.3	150	149.6	10.5	210	209.5	14.6	270	269.3	18.8
31	30.9	02.2	91	90.8	06.3	151	150.6	10.5	211	210.5	14.7	271	270.3	18.9
32	31.9	02.2	92	91.8	06.4	152	151.6	10.6	212	211.5	14.8	272	271.3	19.0
33	32.9	02.3	93	92.8	06.5	153	152.6	10.7	213	212.5	14.9	273	272.3	19.0
34	33.9	02.4	94	93.8	06.6	154	153.6	10.7	214	213.5	14.9	274	273.3	19.1
35	34.9	02.4	95	94.8	06.6	155	154.6	10.8	215	214.5	15.0	275	274.3	19.2
36	35.9	02.5	96	95.8	06.7	156	155.6	10.9	216	215.5	15.1	276	275.3	19.3
37	36.9	02.6	97	96.8	06.8	157	156.6	11.0	217	216.5	15.1	277	276.3	19.3
38	37.9	02.7	98	97.8	06.8	158	157.6	11.0	218	217.5	15.2	278	277.3	19.4
39	38.9	02.7	99	98.8	06.9	159	158.6	11.1	219	218.5	15.3	279	278.3	19.5
40	39.9	02.8	100	99.8	07.0	160	159.6	11.2	220	219.5	15.3	280	279.3	19.5
41	40.9	02.9	101	100.8	07.0	161	160.6	11.2	221	220.5	15.4	281	280.3	19.6
42	41.9	02.9	102	101.8	07.1	162	161.6	11.3	222	221.5	15.5	282	281.3	19.7
43	42.9	03.0	103	102.7	07.2	163	162.6	11.4	223	222.5	15.6	283	282.3	19.7
44	43.9	03.1	104	103.7	07.3	164	163.6	11.4	224	223.5	15.6	284	283.3	19.8
45	44.9	03.1	105	104.7	07.3	165	164.6	11.5	225	224.5	15.7	285	284.3	19.9
46	45.9	03.2	106	105.7	07.4	166	165.6	11.6	226	225.4	15.8	286	285.3	20.0
47	46.9	03.3	107	106.7	07.5	167	166.6	11.6	227	226.4	15.8	287	286.3	20.0
48	47.9	03.3	108	107.7	07.5	168	167.6	11.7	228	227.4	15.9	288	287.3	20.1
49	48.9	03.4	109	108.7	07.6	169	168.6	11.8	229	228.4	16.0	289	288.3	20.2
50	49.9	03.5	110	109.7	07.7	170	169.6	11.9	230	229.4	16.0	290	289.3	20.2
51	50.9	03.6	111	110.7	07.7	171	170.6	11.9	231	230.4	16.1	291	290.3	20.3
52	51.9	03.6	112	111.7	07.8	172	171.6	12.0	232	231.4	16.2	292	291.3	20.4
53	52.9	03.7	113	112.7	07.9	173	172.6	12.1	233	232.4	16.3	293	292.3	20.4
54	53.9	03.8	114	113,7	08.0	174	173.6	12.1	234	233.4	16.3	294	293.3	20.5
55	54.9	03.8	115	114.7	08.0	175	174.6	12.2	235	234.4	16.4	295	294.3	20.6
56	55.9	03.9	116	115.7	08.1	176	175.6	12.3	236	235.4	16.5	296	295.3	20.6
57	56.9	04.0	117	116.7	08.2	177	176.6	12.3	237	236.4	16.5	297	296.3	20.7
58	57.9	04.0	118	117.7	08.2	178	177.6	12.4	238	237.4	16.6	298	297.3	20.8
59	58.9	04.1	119	118.7	08.3	179	178.6	12.5	239	238.4	16.7	299	298.3	20.9
60	59.9	04.2	120	119.7	08.4	180	179.6	12.6	240	239.4	16.7	300	299.3	20.9
Dist	Dep	Lat.	Dist	Dep	Lat	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 86 Degrees.

TABLE II. Difference of Latitude and Departure for 5 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep	Dist	Lat.	Dep	Dist	Lat,	Dep
1	01.0	00.1	61	60.8	05.3	121	120.5	10.5	181	180.3	15.8	241	240.1	21.0
2	02.0	00.2	62	61.8	05.4	122	121.5	10.6	182	181.3	15.9	242	241.1	21.1
3	03.0	00.3	63	62.8	05.5	123	122.5	10.7	183	182.3	15.9	243	242.1	21.2
4	04.0	00.3	64	63.8	05.6	124	123.5	10.8	184	183.3	16.0	244	243.1	21.3
5	05.0	00.4	65	64.8	05.7	125	124·5	10.9	185	184.3	16.1	245	244.1	21.4
6	06.0	00.5	66	65.7	05.8	126	125.5	11.0	186	185.3	16.2	246	245.1	21.4
7	07.0	00.6	67	66.7	05.8	127	126.5	11.1	187	186.3	16.3	247	246.1	21.5
8	08.0	00.7	68	67.7	05.9	128	127.5	11.2	188	187.3	16.4	248	247.1	21.6
9	09.0	00.8	69	68.7	06.0	129	128.5	11.2	189	188.3	16.5	249	248.1	21.7
10	10.0	00.9	70	69.7	06.1	130	129.5	11.3	190	189.3	16.6	250	249.0	21.8
11	11.0	01.0	71	70.7	06.2	131	130.5	11.4	191	190.3	16.6	251	250.0	21.9
12	12.0	01.0	72	71.7	06.3	132	131.5	11.5	192	191.3	16.7	252	251.0	22.0
13	13.0	01.1	73	72.7	06.4	133	132.5	11.6	193	192.3	16.8	253	252.0	22.1
14	13.9	01.2	74	73.7	06.4	134	133.5	11.7	194	193.3	16.9	254	253.0	22.1
15	14.9	01.3	75	74.7	06.5	135	134.5	11.8	195	194.3	17.0	255	254.0	22.2
16	15.9	01.4	76	75.7	06.6	136	135.5	11.9	196	195.3	17.1	256	255.0	22.3
17	16.9	01.5	77	76.7	06.7	137	136.5	11.9	197	196.3	17.2	257	256.0	22.4
18	17.9	01.6	78	77.7	06.8	138	137.5	12.0	198	197.2	17.3	258	257.0	22.5
19	18.9	01.7	79	78.7	06.9	139	138.5	12.1	199	198.2	17.3	259	258.0	22.6
20	19.9	01.7	80	79.7	07.0	140	139.5	12.2	200	199.2	17.4	260	259.0	22.7
21	20.9	01.8	81	80.7	07.1	141	140.5	12.3	201	200.2	17.5	261	260.0	22.7
22	21.9	01.9	82	81.7	07.1	142	141.5	12.4	202	201.2	17.6	262	261.0	22.8
23	22.9	02.0	83	82.7	07.2	143	142.5	12.5	203	202.2	17.7	263	262.0	22.9
24	23.9	02.1	84	83.7	07.3	144	143.5	12.6	204	203.2	17.8	264	263.0	23.0
25	24.9	02.2	85	84.7	07.4	145	144.4	12.6	205	204.2	17.9	265	264.0	23.1
26	25.9	02.3	86	85.7	07.5	146	145.4	12.7	206	205.2	18.0	266	265.0	23.2
27	26.9	02.4	87	86.7	07.6	147	146.4	12.8	207	206.2	18.0	267	266.0	23.3
28	27.9	02.4	88	87.7	07.7	148	147.4	12.9	208	207.2	18.1	268	267.0	23.4
29	28.9	02.5	89	88.7	07.8	149	148.4	13.0	209	208.2	18.2	269	268.0	23.4
30	29.9	02.6	90	89.7	07.8	150	149.4	13.1	210	209.2	18.3	270	269.0	23.5
31	30.9	02.7	91	90.7	07.9	151	150.4	13.2	211	210.2	18.4	271	270.0	23.6
32	31.9	02.8	92	91.6	08.0	152	151.4	13.2	212	211.2	18.5	272	271.0	23.7
33	32.9	02.9	93	92.6	08.1	153	152.4	13.3	213	212.2	18.6	273	272.0	23.8
34	33.9	03.0	94	93.6	08.2	154	153.4	13.4	214	213.2	18.7	274	273.0	23.9
35	34.9	03.1	95	94.6	08.3	155	154.4	13.5	215	214.2	18.7	275	274.0	24.0
36	35.9	03.1	96	95.6	08.4	156	155.4	13.6	216	215.2	18.8	276	274.9	24.1
37	36.9	03.2	97	96.6	08.5	157	156.4	13.7	217	216.2	18.9	277	275.9	24.1
38	37.9	03.3	98	97.6	08.5	158	157.4	13.8	218	217.2	19.0	278	276.9	24.2
39	38.9	03.4	99	98.6	08.6	159	158.4	13.9	219	218.2	19.1	279	277.9	24.3
40	39.8	03.5	100	99.6	08.7	160	159.4	13.9	220	219.2	19.2	280	278.9	24.4
41	40.8	03.6	101	100.6	08.8	161	160.4	14.0	221	220.2	19.3	281	279.9	24.5
42	41.8	03.7	102	101.6	08.9	162	161.4	14.1	222	221.2	19.3	282	280.9	24.6
43	42.8	03.7	103	102.6	09.0	163	162.4	14.2	223	222.2	19.4	283	281.9	24.7
44	43.8	03.8	104	103.6	09.1	164	163.4	14.3	224	223.1	19.5	284	282.9	24.8
45	44.8	03.9	105	104.6	09.2	165	164.4	14.4	225	224.1	19.6	285	283.9	24.8
46	45.8	04.0	106	105.6	09.2	166	165.4	14.5	226	225.1	19.7	286	284.9	24.9
47	46.8	04.1	107	106.6	09.3	167	166.4	14.6	227	226.1	19.8	287	285.9	25.0
48	47.8	04.2	108	107.6	09.4	168	167.4	14.6	228	227.1	19.9	288	286.9	25.1
49	48.8	04.3	109	108.6	09.5	169	168.4	14.7	229	228.1	20.0	289	287.9	25.2
50	49.8	04.4	110	109.6	09.6	170	169.4	14.8	230	229.1	20.0	290	288.9	25.3
51	50.8	04.4	111	110.6	09.7	171	170.3	14.9	231	230.1	20.1	291	289.9	25.4
52	51.8	04.5	112	111.6	09.8	172	171.3	15.0	232	231.1	20.2	292	290.9	25.4
53	52.8	04.6	113	112.6	09.8	173	172.3	15.1	233	232.1	20.3	293	291.9	25.5
54	53.8	04.7	114	113.6	09.9	174	173.3	15.2	234	233.1	20.4	294	292.9	25.6
55	54.8	04.8	115	114.6	10.0	175	174.3	15.3	235	234.1	20.5	295	293.9	25.7
56	55.8	04.9	116	115.6	10.1	176	175.3	15.3	236	235.1	20.6	296	294.9	25.8
57	56.8	05.0	117	116.6	10.2	177	176.3	15.4	237	236.1	20.7	297	295.9	25.9
58	57.8	05.1	118	117.6	10.3	178	177.3	15.5	238	237.1	20.7	298	296·9	26.0
59	58.8	05.1	119	118.5	10.4	179	178.3	15.6	239	238.1	20.8	299	297.9	26.1
60	59.8	05.2	120	119.5	10.5	180	179.3	15.7	240	239.1	20.9	300	298.9	26.1
Dist	Dep	Lat,	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 85 Degrees.

TABLE II. Difference of Latitude and Departure for 6 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.7	06.4	121	120.3	12.6	181	180.0	18.9	241	239.7	25.2
2	02.0	00.2	62	61.7	06.5	122	121.3	12.8	182	181.0	19.0	242	240.7	25.3
3	03.0	00.3	63	62.7	06.6	123	122.3	12.9	133	182.0	19.1	243	241.7	25.4
4	04.0	00.4	64	63.6	06.7	124	123.3	13.0	184	183.0	19.2	244	242.7	25.5
5	05.0	00.5	65	64.6	06.8	125	124.3	13.1	185	184.0	19.3	245	243.7	25.6
6	06.0	00.6	66	65.6	06.9	126	125.3	13.2	186	185.0	19.4	246	244.7	25.7
7	07.0	00.7	67	66.6	07.0	127	126.3	13.3	187	186.0	19.5	247	245.6	25.8
8	08.0	00.8	68	67.6	07.1	128	127.3	13.4	188	187.0	19.7	248	246.6	25.9
9	09.0	00.9	69	68.6	07.2	129	128.3	13.5	189	188.0	19.8	249	247.6	26.0
10	09.9	01.0	70	69.6	07.3	130	129.3	13.6	190	189.0	19.9	250	248.6	26.1
11	10.9	01.1	71	70.6	07.4	131	130.3	13.7	191	190.0	20.0	251	249.6	26.2
12	11.9	01.3	72	71.6	07.5	132	131.3	13.8	192	190.9	20.1	252	250.6	26.3
13	12.9	01.4	73	72.6	07.6	133	132.3	13.9	193	191.9	20.2	253	251.6	26.4
14	13.9	01.5	74	73.6	07.7	134	133.2	14.0	194	192.9	20.3	254	252.6	26.6
15	14.9	01.6	75	74.6	07.8	135	134.3	14.1	195	193.9	20.4	255	253.6	26.7
16	15.9	01.7	76	75.6	07.9	136	135.3	14.2	196	194.9	20.5	256	254.6	26.8
17	16.9	01.8	77	76.6	08.0	137	136.2	14.3	197	195.9	20.6	257	255.6	26.9
18	17.9	01.9	78	77.6	08.2	138	137.2	14.4	198	196.9	20.7	258	256.6	27.0
19	18.9	02.0	79	78.6	08.3	139	138.2	14.5	199	197.9	20.8	259	257.6	27.1
20	19.9	02.1	80	79.6	08.4	140	139.2	14.6	200	198.9	20.9	260	258.6	27.2
21	20.9	02.2	81	80.6	08.5	141	140.2	14.7	201	199.9	21.0	261	259.6	27.3
22	21.9	02.3	82	81.6	08.6	142	141.2	14.8	202	200.9	21.1	262	260.6	27.4
23	22.9	02.4	83	82.5	08.7	143	142.2	14.9	203	201.9	21.2	263	261.6	27.5
24	23.9	02.5	84	83.5	08.8	144	143.2	15.1	204	202.9	21.3	264	262.6	27.6
25	24.9	02.6	85	84.5	08.9	145	144.2	15.2	205	203.9	21.4	265	263.5	27.7
26	25.9	02.7	86	85.5	09.0	146	145.2	15.3	206	204.9	21.5	266	264.5	27.8
27	26.9	02.8	87	86.5	09.1	147	146.2	15.4	207	205.9	21.6	267	265.5	27.9
28	27.8	02.9	88	87.5	09.2	148	147.2	15.5	208	206.9	21.7	268	266.5	28.0
29	28.8	03.0	89	88.5	09.3	149	148.2	15.6	209	207.9	21.8	269	267.5	28.1
30	29.8	03.1	90	89.5	09.4	150	149.2	15.7	210	208.8	22.0	270	268.5	28.2
31	30.8	03.2	91	90.5	09.5	151	150.2	15.8	211	209.8	22.1	271	269.5	28.3
32	31.8	03.3	92	91.5	09.6	152	151.2	15.9	212	210.8	22.2	272	270.5	28.4
33	32.8	03.4	93	92.5	09.7	153	152.2	16.0	213	211.8	22.3	273	271.5	28.5
34	33.8	03.6	94	93.5	09.8	154	153.2	16.1	214	212.8	22.4	274	272.5	28.6
35	34.8	03.7	95	94.5	09.9	155	154.2	16.2	215	213.8	22.5	275	273.5	28.7
36	35.8	03.8	96	95.5	10.0	156	155.1	16.3	216	214.8	22.6	276	274.5	28.8
37	36.8	03.9	97	96.5	10.1	157	156.1	16.4	217	215.8	22.7	277	275.5	29.0
38	37.8	04.0	98	97.5	10.2	158	157.1	16.5	218	216.8	22.8	278	276.5	29.1
39	38.8	04.1	99	98.5	10.3	159	158.1	16.6	219	217.8	22.9	279	277.5	29.2
40	39.8	04.2	100	99.5	10.5	160	159.1	16.7	220	218.8	23.0	280	278.5	29.3
41	40.8	04.3	101	100.4	10.6	161	160.1	16.8	221	219.8	23.1	281	279.5	29.4
42	41.8	04.4	102	101.4	10.7	162	161.1	16.9	222	220.8	23.2	282	280.5	29.5
43	42.8	04.5	103	102.4	10.8	163	162.1	17.0	223	221.8	23.3	283	281.4	29.6
44	43.8	04.6	104	103.4	10.9	164	163.1	17.1	224	222.8	23.4	284	282.4	29.7
45	44.8	04.7	105	104.4	11.0	165	164.1	17.2	225	223.8	23.5	285	283.4	29.8
46	45.7	04.8	106	105.4	11.1	166	165.1	17.4	226	224.8	23.6	286	284.4	29.9
47	46.7	04.9	107	106.4	11.2	167	166.1	17.5	227	225.8	23.7	287	285.4	30.0
48	47.7	05.0	108	107.4	11.3	168	167.1	17.6	228	226.8	23.8	288	286.4	30.1
49	48.7	05.1	109	108.4	11.4	169	168.1	17.7	229	227.7	23.9	289	287.4	30.2
50	49,7	05.2	110	109.4	11.5	170	169.1	17.8	230	228.7	24.0	290	288.4	30.3
51	50.7	05.3	111	110.4	11.6	171	170.1	17.9	231	229.7	24.1	291	289.4	30.4
52	51.7	05.4	112	111.4	11.7	172	171.1	18.0	232	230.7	24.3	292	290.4	30.5
53	52.7	05.5	113	112.4	11.8	173	172.1	18.1	233	231.7	24.4	293	291.4	30.6
54	53.7	05.6	114	113.4	11.9	174	173.0	18.2	234	232.7	24.5	294	292.4	30.7
55	54.7	05.7	115	114.4	12.0	175	174.0	18.3	235	233.7	24.6	295	293.4	30.8
56	55.7	05.9	116	115.4	12.1	176	175.0	18.4	236	234.7	24.7	296	294.4	30.9
57	56.7	06.0	117	116.4	12.2	177	176.0	18.5	237	235.7	24.8	297	295.4	31.0
58	57.7	06.1	118	117.4	12.3	178	177.0	18.6	238	236.7	24.9	298	296.4	31.1
59	58.7	06.2	119	118.3	13.4	179	178.0	18.7	239	237.7	25.0	299	297.4	31.3
60	59.7	06.3	120	119.3	12.5	180	179.0	18.8	240	238.7	25.1	300	298.4	31.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 84 Degrees.

TABLE II. Difference of Latitude and Departure for 7 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.5	07.4	121	120.1	14.7	181	179.7	22.1	241	239.2	29.4
2	02.0	00.2	62	61.5	07.6	122	121.1	14.9	182	180.6	22.2	242	240.2	29.5
3	03.0	00.4	63	62.5	07.7	123	122.1	15.0	183	181.6	22.3	243	241.2	29.6
4	04.0	00.5	64	63.5	07.8	124	123.1	15.1	184	182.6	22.4	244	242.2	29.7
5	05.0	00.6	65	64.5	07.9	125	124.1	15.2	185	183.6	22.5	245	243.2	29.9
6	06.0	00.7	66	65.5	08.0	126	125.1	15.4	186	184.6	22.7	246	244.2	30.0
7	06.9	00.9	67	66.5	08.2	127	126.1	15.5	187	185.6	22.8	247	245.2	30.1
8	07.9	01.0	68	67.5	08.3	128	127.0	15.6	188	186.6	22.9	248	246.2	30.2
9	08.9	01.1	69	68.5	08.4	129	128.0	15.7	189	187.6	23.0	249	247.1	30.3
10	09.9	01.2	70	69.5	08.5	130	129.0	15.8	190	188.6	23.2	250	248.1	30.5
11	10.9	01.3	71	70.5	08.7	131	130.0	16.0	191	189.6	23.3	251	249.1	30.6
12	11.9	01.5	72	71.5	08.8	132	131.0	16.1	192	190.6	23.4	252	250.1	30.7
13	12.9	01.6	73	72.5	08.9	133	132.0	16.2	193	191.6	23.5	253	251.1	30.8
14	13.9	01.7	74	73.4	09.0	134	133.0	16.3	194	192.6	23.6	254	252.1	31.0
15	14.9	01.8	75	74.4	09.1	135	134.0	16.5	195	193.5	23.8	255	253.1	31.1
16	15.9	01.9	76	75.4	09.3	136	135.0	16.6	196	194.5	23.9	256	254.1	31.2
17	16.9	02.1	77	76.4	09.4	137	136.0	16.7	197	195.5	24.0	257	255.1	31.3
18	17.9	02.2	78	77.4	09.5	138	137.0	16.8	198	196.5	24.1	258	256.1	31.4
19	18.9	02.3	79	78.4	09.6	139	138.0	16.9	199	197.5	24.3	259	257.1	31.6
20	19.9	02.4	80	79.4	09.7	140	139.0	17.1	200	198.5	24.4	260	258.1	31.7
21	20.8	02.6	81	80.4	09.9	141	139.9	17.2	201	199.5	24.5	261	259.1	31.8
22	21.8	02.7	82	81.4	10.0	142	140.9	17.3	202	200.5	24.6	262	260.0	31.9
23	22.8	02.8	83	82.4	10.1	143	141.9	17.4	203	201.5	24.7	263	261.0	32.1
24	23.8	02.9	84	83.4	10.2	144	142.9	17.5	204	202.5	24.9	264	262.0	32.2
25	24.8	03.0	85	84.4	10.4	145	143.9	17.7	205	203.5	25.0	265	263.0	32.3
26	25.8	03.2	86	85.4	10.5	146	144.9	17.8	206	204.5	25.1	266	264.0	32.4
27	26.8	03.3	87	86.4	10.6	147	145.9	17.9	207	205.5	25.2	267	265.0	32.5
28	27.8	03.4	88	87.3	10.7	148	146.9	18.0	208	206.4	25.3	268	266.0	32.7
29	28.8	03.5	89	88.3	10.8	149	147.9	18.2	209	207.4	25.5	269	267.0	32.8
30	29.8	03.7	90	89.3	11.0	150	148.9	18.3	210	208.4	25.6	270	268.0	32.9
31	30.8	03.8	91	90.3	11.1	151	149.9	18.4	211	209.4	25.7	271	269.0	33.0
32	31.8	03.9	92	91.3	11.2	152	150.9	18.5	212	210.4	25.8	272	270.0	33.1
33	32.8	04.0	93	92.3	11.3	153	151.9	18.6	213	211.4	26.0	273	271.0	33.3
34	33.7	04.1	94	93.3	11.5	154	152.9	18.8	214	212.4	26.1	274	272.0	33.4
35	34.7	04.3	95	94.3	11.6	155	153.8	18.9	215	213.4	26.2	275	273.0	33.5
36	35.7	04.4	96	95.3	11.7	156	154.8	19.0	216	214.4	26.3	276	273.9	33.6
37	36.7	04.5	97	96.3	11.8	157	155.8	19.1	217	215.4	26.4	277	274.9	33.8
38	37.7	04.6	98	97.3	11.9	158	156.8	19.3	218	216.4	26.6	278	275.9	33.9
39	38.7	04.8	99	98.3	12.1	159	157.8	19.4	219	217.4	26.7	279	276.9	34.0
40	39.7	04.9	100	99.3	12.2	160	158.8	19.5	220	218.4	26.8	280	277.9	34.1
41	40.7	05.0	101	100.2	12.3	161	159.8	19.6	221	219.4	26.9	281	278.9	34.2
42	41.7	05.1	102	101.2	12.4	162	160.8	19.7	222	220.3	27.1	282	279.9	34.4
43	42.7	05.2	103	102.2	12.6	163	161.8	19.9	223	221.3	27.2	283	280.9	34.5
44	43.7	05.4	104	103.2	12.7	164	162.8	20.0	224	222.3	27.3	284	281.9	34.6
45	44.7	05.5	105	104.2	12.8	165	163.8	20.1	225	223.3	27.4	285	282.9	34.7
46	45.7	05.6	106	105.2	12.9	166	164.8	20.2	226	224.3	27.5	286	283.9	34.9
47	46.6	05.7	107	106.2	13.0	167	165.8	20.4	227	225.3	27.7	287	284.9	35.0
48	47.6	05.8	108	107.2	13.2	168	166.7	20.5	228	226.3	27.8	288	285.9	35.1
49	48.6	06.0	109	108.2	13.3	169	167.7	20.6	229	227.3	27.9	289	286.8	35.2
50	49.6	06.1	110	109.2	13.4	170	168.7	20.7	230	228.3	28.0	290	287.8	35.3
51	50.6	06.2	111	110.2	13.5	171	169.7	20.8	231	229.3	28.2	291	288.8	35.5
52	51.6	06.3	112	111.2	13.6	172	170.7	21.0	232	230.3	28.3	292	289.8	35.6
53	52.6	06.5	113	112.2	13.8	173	171.7	21.1	233	231.3	28.4	293	290.8	35.7
54	53.6	06.6	114	113.2	13.9	174	172.7	21.2	234	232.3	28.5	294	291.8	35.8
55	54.6	06.7	115	114.1	14.0	175	173.7	21.3	235	233.2	28.6	295	292.8	36.0
56	55.6	06.8	116	115.1	14.1	176	174.7	21.4	236	234.2	28.8	296	293.8	36.1
57	56.6	06.9	117	116.1	14.3	177	175.7	21.6	237	235.2	28.9	297	294.8	36.2
58	57.6	07.1	118	117.1	14.4	178	176.7	21.7	238	236.2	29.0	298	295.8	36.3
59	58.6	07.2	119	118.1	14.5	179	177.7	21.8	239	237.2	29.1	299	296.8	36.4
60	59.6	07.3	120	119.1	14.6	180	178.7	21.9	240	238.2	29.2	300	297.8	36.6
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 83 Degrees.

TABLE II. Difference of Latitude and Departure for 8 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.1	61	60.4	08.5	121	119.8	16.8	181	179.2	25.2	241	238.7	33.5
2	02.0	00.3	62	61.4	08.6	122	120.8	17.0	182	180.2	25.3	242	239.6	33.7
3	03.0	00.4	63	62.4	08.8	123	121.8	17.1	183	181.2	25.5	243	240.6	33.8
4	04.0	00.6	64	63.4	08.9	124	122.8	17.3	184	182.2	25.6	244	241.6	34.0
5	05.0	00.7	65	64.4	09.0	125	123.8	17.4	185	183.2	25.7	245	242.6	34.1
6	05.9	00.8	66	65.4	09.2	126	124.8	17.5	186	184.2	25.9	246	243.6	34.2
7	06.9	01.0	67	66.3	09.3	127	125.8	17.7	187	185.2	26.0	247	244.6	34.4
8	07.9	01.1	68	67.3	09.5	128	126.8	17.8	188	186.2	26.2	248	245.6	34.5
9	08.9	01.3	69	68.3	09.6	129	127.7	18.0	189	187.2	26.3	249	246.6	34.7
10	09.9	01.4	70	69.3	09.7	130	128.7	18.1	190	188.2	26.4	250	247.6	34.8
11	10.9	01.5	71	70.3	09.9	131	129.7	18.2	191	189.1	26.6	251	248.6	34.9
12	11.9	01.7	72	71.3	10.0	132	130.7	18.4	192	190.1	26.7	252	249.5	35.1
13	12.9	01.8	73	72.3	10.2	133	131.7	18.5	193	191.1	26.9	253	250.5	35.2
14	13.9	01.9	74	73.3	10.3	134	132.7	18.6	194	192.1	27.0	254	251.5	35.3
15	14.9	02.1	75	74.3	10.4	135	133.7	18.8	195	193.1	27.1	255	252.5	35.5
16	15.8	02.2	76	75.3	10.6	136	134.7	18.9	196	194.1	27.3	256	253.5	35.6
17	16.8	02.4	77	76.3	10.7	137	135.7	19.1	197	195.1	27.4	257	254.5	35.8
18	17.8	02.5	78	77.2	10.9	138	136.7	19.2	198	196.1	27.6	258	255.5	35.9
19	18.8	02.6	79	78.2	11.0	139	137.7	19.3	199	197.1	27.7	259	256.5	36.0
20	19.8	02.8	80	79.2	11.1	140	138.6	19.5	200	198.1	27.8	260	257.5	36.2
21	20.8	02.9	81	80.2	11.3	141	139.6	19.6	201	199.0	28.0	261	258.5	36.3
22	21.8	03.1	82	81.2	11.4	142	140.6	19.8	202	200.0	28.1	262	259.5	36.5
23	22.8	03.2	83	82.2	11.6	143	141.6	19.9	203	201.0	28.3	263	260.4	36.6
24	23.8	03.3	84	83.2	11.7	144	142.6	20.0	204	202.0	28.4	264	261.4	36.7
25	24.8	03.5	85	84.2	11.8	145	143.6	20.2	205	203.0	28.5	265	262.4	36.9
26	25.7	03.6	86	85.2	12.0	146	144.6	20.3	206	204.0	28.7	266	263.4	37.0
27	26.7	03.8	87	86.2	12.1	147	145.6	20.5	207	205.0	28.8	267	264.4	37.2
28	27.7	03.9	88	87.1	12.2	148	146.6	20.6	208	206.0	28.9	268	265.4	37.3
29	28.7	04.0	89	88.1	12.4	149	147.5	20.7	209	207.0	29.1	269	266.4	37.4
30	29.7	04.2	90	89.1	12.5	150	148.5	20.9	210	208.0	29.2	270	267.4	37.6
31	30.7	04.3	91	90.1	12.7	151	149.5	21.0	211	208.9	29.4	271	268.4	37.7
32	31.7	04.5	92	91.1	12.8	152	150.5	21.2	212	209.9	29.5	272	269.4	37.9
33	32.7	04.6	93	92.1	12.9	153	151.5	21.3	213	210.9	29.6	273	270.3	38.0
34	33.7	04.7	94	93.1	13.1	154	152.5	21.4	214	211.9	29.8	274	271.3	38.1
35	34.7	04.9	95	94.1	13.2	155	153.5	21.6	215	212.9	29.9	275	272.3	38.3
36	35.6	05.0	96	95.1	13.4	156	154.5	21.7	216	213.9	30.1	276	273.3	38.4
37	36.6	05.1	97	96.1	13.5	157	155.5	21.9	217	214.9	30.2	277	274.3	38.6
38	37.6	05.3	98	97.0	13.6	158	156.5	22.0	218	215.9	30.3	278	275.3	38.7
39	38.6	05.4	99	98.0	13.8	159	157.5	22.1	219	216.9	30.5	279	276.3	38.8
40	39.6	05.6	100	99.0	13.9	160	158.4	22.3	220	217.9	30.6	280	277.3	39.0
41	40.6	05.7	101	100.0	14.1	161	159.4	22.4	221	218.8	30.8	281	278.3	39.1
42	41.6	05.8	102	101.0	14.2	162	160.4	22.5	222	219.8	30.9	282	279.3	39.2
43	42.6	06.0	103	102.0	14.3	163	161.4	22.7	223	220.8	31.0	283	280.2	39.4
44	43.6	06.1	104	103.0	14.5	164	162.4	22.8	224	221.8	31.2	284	281.2	39.5
45	44.6	06.3	105	104.0	14.6	165	163.4	23.0	225	222.8	31.3	285	282.2	39.7
46	45.6	06.4	106	105.0	14.8	166	164.4	23.1	226	223.8	31.5	286	283.2	39.8
47	46.5	06.5	107	106.0	14.9	167	165.4	23.2	227	224.8	31.6	287	284.2	39.9
48	47.5	06.7	108	106.9	15.0	168	166.4	23.4	228	225.8	31.7	288	285.2	40.1
49	48.5	06.8	109	107.9	15.2	169	167.4	23.5	229	226.8	31.9	289	286.2	40.2
50	49.5	07.0	110	108.9	15.3	170	168.3	23.7	230	227.8	32.0	290	287.2	40.4
51	50.5	07.1	111	109.9	15.4	171	169.3	23.8	231	228.8	32.1	291	288.2	40.5
52	51.5	07.2	112	110.9	15.6	172	170.3	23.9	232	229.7	32.3	292	289.2	40.6
53	52.5	07.4	113	111.9	15.7	173	171.3	24.1	233	230.7	32.4	293	290.1	40.8
54	53.5	07.5	114	112.9	15.9	174	172.3	24.2	234	231.7	32.6	294	291.1	40.9
55	54.5	07.7	115	113.9	16.0	175	173.3	24.4	235	232.7	32.7	295	292.1	41.1
56	55.5	07.8	116	114.9	16.1	176	174.3	24.5	236	233.7	32.8	296	293.1	41.2
57	56.4	07.9	117	115.9	16.3	177	175.3	24.6	237	234.7	33.0	297	294.1	41.3
58	57.4	08.1	118	116.9	16.4	178	176.3	24.8	238	235.7	33.1	298	295.1	41.5
59	58.4	08.2	119	117.8	16.6	179	177.3	24.9	239	236.7	33.3	299	296.1	41.6
60	59.4	08.4	120	118.8	16.7	180	178.2	25.1	240	237.7	33.4	300	297.1	41.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 82 Degrees.

TABLE II. Difference of Latitude and Departure for 9 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	60.2	09.5	121	119.5	18.9	181	178.8	28.3	241	238.0	37.7
2	02.0	00.3	62	61.2	09.7	122	120.5	19.1	182	179.8	28.5	242	239.0	37.9
3	03.0	00.5	63	62.2	09.9	123	121.5	19.2	183	180.7	28.6	243	240.0	38.0
4	04.0	00.6	64	63.2	10.0	124	122.5	19.4	184	181.7	28.8	244	241.0	38.2
5	04.9	00.8	65	64.2	10.2	125	123.5	19.6	185	182.7	28.9	245	242.0	38.3
6	05.9	00.9	66	65.2	10.3	126	124.4	19.7	186	183.7	29.1	246	243.0	38.5
7	06.9	01.1	67	66.2	10.5	127	125.4	19.9	187	184.7	29.3	247	244.0	38.6
8	07.9	01.3	68	67.2	10.6	128	126.4	20.0	188	185.7	29.4	248	244.9	38.8
9	08.9	01.4	69	68.2	10.8	129	127.4	20.2	189	186.7	29.6	249	245.9	39.0
10	09.9	01.6	70	69.1	11.0	130	128.4	20.3	190	187.7	29.7	250	246.9	39.1
11	10.9	01.7	71	70.1	11.1	131	129.4	20.5	191	188.6	29.9	251	247.9	39.3
12	11.9	01.9	72	71.1	11.3	132	130.4	20.6	192	189.6	30.0	252	248.9	39.4
13	12.8	02.0	73	72.1	11.4	133	131.4	20.8	193	190.6	30.2	253	249.9	39.6
14	13.8	02.2	74	73.1	11.6	134	132.4	21.0	194	191.6	30.3	254	250.9	39.7
15	14.8	02.3	75	74.1	11.7	135	133.3	21.1	195	192.6	30.5	255	251.9	39.9
16	15.8	02.5	76	75.1	11.9	136	134.3	21.3	196	193.6	30.7	256	252.8	40.0
17	16.8	02.7	77	76.1	12.0	137	135.3	21.4	197	194.6	30.8	257	253.8	40.2
18	17.8	02.8	78	77.0	12.2	138	136.3	21.6	198	195.6	31.0	258	254.8	40.4
19	18.8	03.0	79	78.0	12.4	139	137.3	21.7	199	196.5	31.1	259	255.8	40.5
20	19.8	03.1	80	79.0	12.5	140	138.3	21.9	200	197.5	31.3	260	256.8	40.7
21	20.7	03.3	81	80.0	12.7	141	139.3	22.1	201	198.5	31.4	261	257.8	40.8
22	21.7	03.4	82	81.0	12.8	142	140.3	22.2	202	199.5	31.6	262	258.8	41.0
23	22.7	03.6	83	82.0	13.0	143	141.2	22.4	203	200.5	31.8	263	259.8	41.1
24	23.7	03.8	84	83.0	13.1	144	142.2	22.5	204	201.5	31.9	264	260.7	41.3
25	24.7	03.9	85	84.0	13.3	145	143.2	22.7	205	202.5	32.1	265	261.7	41.5
26	25.7	04.1	86	84.9	13.5	146	144.2	22.8	206	203.5	32.2	266	262.7	41.6
27	26.7	04.2	87	85.9	13.6	147	145.2	23.0	207	204.5	32.4	267	263.7	41.8
28	27.7	04.4	88	86.9	13.8	148	146.2	23.2	208	205.4	32.5	268	264.7	41.9
29	28.6	04.5	89	87.9	13.9	149	147.2	23.3	209	206.4	32.7	269	265.7	42.1
30	29.6	04.7	90	88.9	14.1	150	148.2	23.5	210	207.4	32.9	270	266.7	42.2
31	30.6	04.8	91	89.9	14.2	151	149.1	23.6	211	208.4	33.0	271	267.7	42.4
32	31.6	05.0	92	90.9	14.4	152	150.1	23.8	212	209.4	33.2	272	268.7	42.6
33	32.6	05.2	93	91.9	14.5	153	151.1	23.9	213	210.4	33.3	273	269.6	42.7
34	33.6	05.3	94	92.8	14.7	154	152.1	24.1	214	211.4	33.5	274	270.6	42.9
35	34.6	05.5	95	93.8	14.9	155	153.1	24.2	215	212.4	33.6	275	271.6	43.0
36	35.6	05.6	96	94.8	15.0	156	154.1	24.4	216	213.3	33.8	276	272.6	43.2
37	36.5	05.8	97	95.8	15.2	157	155.1	24.6	217	214.3	33.9	277	273.6	43.3
38	37.5	05.9	98	96.8	15.3	158	156.1	24.7	218	215.3	34.1	278	274.6	43.5
39	38.5	06.1	99	97.8	15.5	159	157.0	24.9	219	216.3	34.3	279	275.6	43.6
40	39.5	06.3	100	98.8	15.6	160	158.0	25.0	220	217.3	34.4	280	276.6	43.8
41	40.5	06.4	101	99.8	15.8	161	159.0	25.2	221	218.3	34.6	281	277.5	44.0
42	41.5	06.6	102	100.7	16.0	162	160.0	25.3	222	219.3	34.7	282	278.5	44.1
43	42.5	06.7	103	101.7	16.1	163	161.0	25.5	223	220.3	34.9	283	279.5	41.3
44	43.5	06.9	104	102.7	16.3	164	162.0	25.7	224	221.2	35.0	284	280.5	44.4
45	44.4	07.0	105	103.7	16.4	165	163.0	25.8	225	222.2	35.2	285	281.5	44.6
46	45.4	07.2	106	104.7	16.6	166	164.0	26.0	226	223.2	35.4	286	282.5	44.7
47	46.4	07.4	107	105.7	16.7	167	164.9	26.1	227	224.2	35.5	287	283.5	44.9
48	47.4	07.5	108	106.7	16.9	168	165.9	26.3	228	225.2	35.7	288	284.5	45.4
49	48.4	07.7	109	107.7	17.1	169	166.9	26.4	229	226.2	35.8	289	285.4	45.2
50	49.4	07.8	110	108.6	17.2	170	167.9	26.6	230	227.2	36.0	290	286.4	45.4
51	50.4	08.0	111	109.6	17.4	171	168.9	26.8	231	228.2	36.1	291	287.4	45.5
52	51.4	08.1	112	110.6	17.5	172	169.9	26.9	232	229.1	36.3	292	288.4	45.7
53	52.3	08.3	113	111.6	17.7	173	170.9	27.1	233	230.1	36.4	293	289.4	45.8
54	53.3	08.4	114	112.6	17.8	174	171.9	27.2	234	231.1	36.6	294	290.4	46.0
55	54.3	08.6	115	113.6	18.0	175	172.8	27.4	235	232.1	36.8	295	291.4	46.1
56	55.3	08.8	116	114.6	18.1	176	173.8	27.5	236	233.1	36.9	296	292.4	46.3
57	56.3	08.9	117	115.6	18.3	177	174.8	27.7	237	234.1	37.1	297	293.3	46.5
58	57.3	09.1	118	116.5	18.5	178	175.8	27.8	238	235.1	37.2	298	294.3	46.6
59	58.3	09.2	119	117.5	18.6	179	176.8	28.0	239	236.1	37.4	299	295.3	46.8
60	59.3	09.4	120	118.5	18.8	180	177.8	28.2	240	237.0	37.5	300	296.3	46.9
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

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For 81 Degrees.

TABLE II. Difference of Latitude and Departure for 10 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	60.1	10.6	121	119.2	21.0	181	178.3	31.4	241	237.3	41.8
2	02.0	00.3	62	61.1	10.8	122	120.1	21.2	182	179.2	31.6	242	238.3	42.0
3	03.0	00.5	63	62.0	10.9	123	121.1	21.4	183	180.2	31.8	243	239.3	42.2
4	03.9	00.7	64	63.0	11.1	124	122.1	21.5	184	181.2	32.0	244	240.2	42.4
5	04.9	00.9	65	64.0	11.3	125	123.1	21.7	185	182.2	32.1	245	241.3	42.5
6	05.9	01.0	66	65.0	11.5	126	124.1	21.9	186	183.2	32.3	246	242.3	42.7
7	06.9	01.2	67	66.0	11.6	127	125.1	22.1	187	184.2	32.5	247	243.2	42.9
8	07.9	01.4	68	67.0	11.8	128	126.1	22.2	188	185.1	32.6	248	244.2	43.1
9	08.9	01.6	69	68.0	12.0	129	127.0	22.4	189	186.1	32.8	249	245.2	43.2
10	09.8	01.7	70	68.9	12.2	130	128.0	22.6	190	187.1	33.0	250	246.2	43.4
11	10.8	01.9	71	69.9	12.3	131	129.0	22.7	191	188.1	33.2	251	247.2	43.6
12	11.8	02.1	72	70.9	12.5	132	130.0	22.9	192	189.1	33.3	252	248.2	43.8
13	12.8	02.3	73	71.9	12.7	133	131.0	23.1	193	190.1	33.5	253	249.2	43.9
14	13.8	02.4	74	72.9	12.8	134	132.0	23.3	194	191.1	33.7	254	250.1	44.1
15	14.8	02.6	75	73.9	13.0	135	132.9	23.4	195	192.0	33.9	255	251.1	44.3
16	15.8	02.8	76	74.8	13.2	136	133.9	23.6	196	193.0	34.0	256	252.1	44.5
17	16.7	03.0	77	75.8	13.4	137	134.9	23.8	197	194.0	34.2	257	253.1	44.6
18	17.7	03.1	78	76.8	13.5	138	135.9	24.0	198	195.0	34.4	258	254.1	44.8
19	18.7	03.3	79	77.8	13.7	139	136.9	24.1	199	196.0	34.6	259	255.1	45.0
20	19.7	03.5	80	78.8	13.9	140	137.9	24.3	200	197.0	34.7	260	256.1	45.1
21	20.7	03.6	81	79.8	14.1	141	138.9	24.5	201	197.9	34.9	261	257.0	45.3
22	21.7	03.8	82	80.8	14.2	142	139.8	24.7	202	198.9	35.1	262	258.0	45.5
23	22.7	04.0	83	81.7	14.4	143	140.8	24.8	203	199.9	35.3	263	259.0	45.7
24	23.6	04.2	84	82.7	14.6	144	141.8	25.0	204	200.9	35.4	264	260.0	45.8
25	24.6	04.3	85	83.7	14.8	145	142.8	25.2	205	201.9	35.6	265	261.0	46.0
26	25.6	04.5	86	84.7	14.9	146	143.8	25.4	206	202.9	35.8	266	262.0	46.2
27	26.6	04.7	87	85.7	15.1	147	144.8	25.5	207	203.9	35.9	267	262.9	46.4
28	27.6	04.9	88	86.7	15.3	148	145.8	25.7	208	204.8	36.1	268	263.9	46.5
29	28.6	05.0	89	87.6	15.5	149	146.7	25.9	209	205.8	36.3	269	264.9	46.7
30	29.5	05.2	90	88.6	15.6	150	147.7	26.0	210	206.8	36.5	270	265.9	46.9
31	30.5	05.4	91	89.6	15.8	151	148.7	26.2	211	207.8	36.6	271	266.9	47.1
32	31.5	05.6	92	90.6	16.0	152	149.7	26.4	212	208.8	36.8	272	267.9	47.2
33	32.5	05.7	93	91.6	16.1	153	150.7	26.6	213	209.8	37.0	273	268.9	47.4
34	33.5	05.9	94	92.6	16.3	154	151.7	26.7	214	210.7	37.2	274	269.8	47.6
35	34.5	06.1	95	93.6	16.5	155	152.6	26.9	215	211.7	37.3	275	270.8	47.8
36	35.5	06.3	96	94.5	16.7	156	153.6	27.1	216	212.7	37.5	276	271.8	47.9
37	36.4	06.4	97	95.5	16.8	157	154.6	27.3	217	213.7	37.7	277	272.8	48.1
38	37.4	06.6	98	96.5	17.0	158	155.6	27.4	218	214.7	37.9	278	273.8	48.3
39	38.4	06.8	99	97.5	17.2	159	156.6	27.6	219	215.7	38.0	279	274.8	48.4
40	39.4	06.9	100	98.5	17.4	160	157.6	27.8	220	216.7	38.2	280	275.7	48.6
41	40.4	07.1	101	99.5	17.5	161	158.6	28.0	221	217.6	38.4	281	276.7	48.8
42	41.4	07.3	102	100.5	17.7	162	159.5	28.1	222	218.6	38.5	282	277.7	49.0
43	42.3	07.5	103	101.4	17.9	163	160.5	28.3	223	219.6	38.7	283	278.7	49.1
44	43.3	07.6	104	102.4	18.1	164	161.5	28.5	224	220.6	38.9	284	279.7	49.3
45	44.3	07.8	105	103.4	18.2	165	162.5	28.7	225	221.6	39.1	285	280.7	49.5
46	45.3	08.0	106	104.4	18.4	166	163.5	28.8	226	222.6	39.2	286	281.7	49.7
47	46.3	08.2	107	105.4	18.6	167	164.5	29.0	227	223.6	39.4	287	282.6	49.8
48	47.3	08.3	108	106.4	18.8	168	165.4	29.2	228	224.5	39.6	288	283.6	50.0
49	48.3	08.5	109	107.3	18.9	169	166.4	29.3	229	225.5	39.8	289	284.6	50.2
50	49.2	08.7	110	108.3	19.1	170	167.4	29.5	230	226.5	39.9	290	285.6	50.4
51	50.2	08.9	111	109.3	19.3	171	168.4	29.7	231	227.5	40.1	291	286.6	50.5
52	51.2	09.0	112	110.3	19.4	172	169.4	29.9	232	228.5	40.3	292	287.6	50.7
53	52.2	09.2	113	111.3	19.6	173	170.4	30.0	233	229.5	40.5	293	288.5	50.9
54	53.2	09.4	114	112.3	19.8	174	171.4	30.2	234	230.4	40.6	294	289.5	51.1
55	54.2	09.6	115	113.3	20.0	175	172.3	30.4	235	231.4	40.8	295	290.5	51.2
56	55.1	09.7	116	114.2	20.1	176	173.3	30.6	236	232.4	41.0	296	291.5	51.4
57	56.1	09.9	117	115.2	20.3	177	174.3	30.7	237	233.4	41.2	297	292.5	51.6
58	57.1	10.1	118	116.2	20.5	178	175.3	30.9	238	234.4	41.3	298	293.5	51.7
59	58.1	10.2	119	117.2	20.7	179	176.3	31.1	239	235.4	41.5	299	294.5	51.9
60	59.1	10.4	120	118.2	20.8	180	177.3	31.3	240	236.4	41.7	300	295.4	52.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 80 Degrees.

TABLE II. Difference of Latitude and Departure for 11 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.9	11.6	121	118.8	23.1	181	177.7	34.5	241	236.6	46.0
2	02.0	00.4	62	60.9	11.8	122	119.8	23.3	182	178.7	34.7	242	237.6	46.2
3	02.9	00.6	63	61.8	12.0	123	120.7	23.5	183	179.6	34.9	243	238.5	46.4
4	03.9	00.8	64	62.8	12.2	124	121.7	23.7	184	180.6	35.1	244	239.5	46.6
5	04.9	01.0	65	63.8	12.4	125	122.7	23.9	185	181.6	35.3	245	240.5	46.7
6	05.9	01.1	66	64.8	12.6	126	123.7	24.0	186	182.6	35.5	246	241.5	46.9
7	06.9	01.3	67	65.8	12.8	127	124.7	24.2	187	183.6	35.7	247	242.5	47.1
8	07.9	01.5	68	66.8	13.0	128	125.6	24.4	188	184.5	35.9	248	243.4	47.3
9	08.8	01.7	69	67.7	13.2	129	126.6	24.6	189	185.5	36.1	249	244.4	47.5
10	09.8	01.9	70	68.7	13.4	130	127.6	24.8	190	186.5	36.3	250	245.4	47.7
11	10.8	02.1	71	69.7	13.5	131	128.6	25.0	191	187.5	36.4	251	246.4	47.9
12	11.8	02.3	72	70.7	13.7	132	129.6	25.2	192	188.5	36.6	252	247.4	48.1
13	12.8	02.5	73	71.7	13.9	133	130.6	25.4	193	189.5	36.8	253	248.4	48.3
14	13.7	02.7	74	72.6	14.1	134	131.5	25.6	194	190.4	37.0	254	249.3	48.5
15	14.7	02.9	75	73.6	14.3	135	132.5	25.8	195	191.4	37.2	255	250.3	48.7
16	15.7	03.1	76	74.6	14.5	136	133.5	26.0	196	192.4	37.4	256	251.3	48.8
17	16.7	03.2	77	75.6	14.7	137	134.5	26.1	197	193.4	37.6	257	252.3	49.0
18	17.7	03.4	78	76.6	14.9	138	135.5	26.3	198	194.4	37.8	258	253.3	49.2
19	18.7	03.6	79	77.5	15.1	139	136.4	26.5	199	195.3	38.0	259	254.2	49.4
20	19.6	03.8	80	78.5	15.3	140	137.4	26.7	200	196.3	38.2	260	255.2	49.6
21	20.6	04.0	81	79.5	15.5	141	138.4	26.9	201	197.3	38.4	261	256.2	49.8
22	21.6	04.2	82	80.5	15.6	142	139.4	27.1	202	198.3	38.5	262	257.2	50.0
23	22.6	04.4	83	81.5	15.8	143	140.4	27.3	203	199.3	38.7	263	258.2	50.2
24	23.6	04.6	84	82.5	16.0	144	141.4	27.5	204	200.3	38.9	264	259.1	50.4
25	24.5	04.8	85	83.4	16.2	145	142.3	27.7	205	201.2	39.1	265	260.1	50.6
26	25.5	05.0	86	84.4	16.4	146	143.3	27.9	206	202.2	39.3	266	261.1	50.8
27	26.5	05.2	87	85.4	16.6	147	144.3	28.0	207	203.2	39.5	267	262.1	50.9
28	27.5	05.3	88	86.4	16.8	148	145.3	28.2	208	204.2	39.7	268	263.1	51.1
29	28.5	05.5	89	87.4	17.0	149	146.3	28.4	209	205.2	39.9	269	264.1	51.3
30	29.4	05.7	90	88.3	17.2	150	147.2	28.6	210	206.1	40.1	270	265.0	51.5
31	30.4	05.9	91	89.3	17.4	151	148.2	28.8	211	207.1	40.3	271	266.0	51.7
32	31.4	06.1	92	90.3	17.6	152	149.2	29.0	212	208.1	40.5	272	267.0	51.9
33	32.4	06.3	93	91.3	17.7	153	150.2	29.2	213	209.1	40.6	273	268.0	52.1
34	33.4	06.5	94	92.3	17.9	154	151.2	29.4	214	210.1	40.8	274	269.0	52.3
35	34.4	06.7	95	93.3	18.1	155	152.2	29.6	215	211.0	41.0	275	269.9	52.5
36	35.3	06.9	96	94.2	18.3	156	153.1	29.8	216	212.0	41.2	276	270.9	52.7
37	36.3	07.1	97	95.2	18.5	157	154.1	30.0	217	213.0	41.4	277	271.9	52.9
38	37.3	07.3	98	96.2	18.7	158	155.1	30.1	218	214.0	41.6	278	272.9	53.0
39	38.3	07.4	99	97.2	18.9	159	156.1	30.3	219	215.0	41.8	279	273.9	53.2
40	39.3	07.6	100	98.2	19.1	160	157.1	30.5	220	216.0	42.0	280	274.9	53.4
41	40.2	07.8	101	99.1	19.3	161	158.0	30.7	221	216.9	42.2	281	975.8	53.6
42	41.2	08.0	102	100.1	19.5	162	159.0	30.9	222	217.9	42.4	282	276.8	53.8
43	42.2	08.2	103	101.1	19.7	163	160.0	31.1	223	218.9	42.6	283	277.8	54.0
44	43.2	08.4	104	102.1	19.8	164	161.0	31.3	224	219.9	42.7	284	278.8	54.2
45	44.2	08.6	105	103.1	20.0	165	162.0	31.5	225	220.9	42.9	285	279.8	54.4
46	45.2	08.8	106	104.1	20.2	166	163.0	31.7	226	221.8	43.1	286	280.7	54.6
47	46.1	09.0	107	105.0	20.4	167	163.9	31.9	227	222.8	43.3	287	281.7	54.8
48	47.1	09.2	108	106.0	20.6	168	164.9	32.1	228	223.8	43.5	288	282.7	55.0
49	48.1	09.3	109	107.0	20.8	169	165.9	32.2	229	224.8	43.7	289	283.7	55.1
50	49.1	09.5	110	108.0	21.0	170	166.9	32·4	230	225.8	43.9	290	284.7	55.3
51	50.1	09.7	111	109.0	21.2	171	167.9	32.6	231	226.8	44.1	291	285.7	55.5
52	51.0	09.9	112	109.9	21.4	172	168.8	32.8	232	227.7	44.3	292	286.6	55.7
53	52.0	10.1	113	110.9	21.6	173	169.8	33.0	233	228.7	44.5	293	287.6	55.9
54	53.0	10.3	114	111.9	21.8	174	170.8	33.2	234	229.7	44.6	294	288.6	56.1
55	54.0	10.5	115	112.9	21.9	175	171.8	33.4	235	230.7	44.8	295	289.6	56.3
56	55.0	10.7	116	113.9	22.1	176	172.8	33.6	236	231.7	45.0	296	290.6	56.5
57	56.0	10.9	117	114.9	22.3	177	173.7	33.8	237	232.6	45.2	297	291.5	56.7
58	56.9	11.1	118	115.8	22.5	178	174.7	34.0	238	233.6	45.4	298	292.5	56.9
59	57.9	11.3	119	116.8	22.7	179	175.7	34.2	239	834.6	45.6	299	293.5	57.1
60	58.9	11.4	120	117.8	22.9	180	176.7	34.3	240	235.6	45.8	300	294.5	57.2
Dist	Dep	Lat.	Dist	Dep.	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 79 Degrees.

TABLE II. Difference of Latitude and Departure for 12 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.7	12.7	121	118.4	25.2	181	177.0	37.6	241	235.7	50.1
2	02.0	00.4	62	60.6	12.9	122	119.3	25.4	182	178.0	37.8	242	236.7	50.3
3	02.9	00.6	63	61.6	13.1	123	120.3	25.6	183	179.0	38.0	243	237.7	50.5
4	03.9	00.8	64	62.6	13.3	124	121.3	25.8	184	180.0	38.3	244	238.7	50.7
5	04.9	01.0	65	63.6	13.5	125	122.3	26.0	185	181.0	38.5	245	239.6	50.9
6	05.9	01.2	66	64.6	13.7	126	123.2	26.2	186	181.9	38.7	246	240.6	51.1
7	06.8	01.5	67	65.5	13.9	127	124.2	26.4	187	182.9	38.9	247	241.6	51.4
8	07.8	01.7	68	66.5	14.1	128	125.2	26.6	188	183.9	39.1	248	242.6	51.6
9	08.8	01.9	69	67.5	14.3	129	126.2	26.8	189	134.9	39.3	249	243.6	51.8
10	09.8	02.1	70	68.5	14.6	130	127.2	27.0	190	185.8	39.5	250	244.5	52.0
11	10.8	02.3	71	69.4	14.8	131	128.1	27.2	191	186.8	39.7	251	245.5	52.2
12	11.7	02.5	72	70.4	15.0	132	129.1	27.4	192	187.8	39.9	252	246.5	52.4
13	12.7	02.7	73	71.4	15.2	133	130.1	27.7	193	188.8	40.1	253	247.5	52.6
14	13.7	02.9	74	72.4	15.4	134	131.1	27.9	194	189.8	40.3	254	248.4	52.8
15	14.7	03.1	75	73.4	15.6	135	132.0	28.1	195	190.7	40.5	255	249.4	53.0
16	15.7	03.3	76	74.3	15.8	136	133.0	28.3	196	191.7	40.8	256	250.4	53.2
17	16.6	03.5	77	75.3	16.0	137	134.0	28.5	197	192.7	41.0	257	251.4	53.4
18	17.6	03.7	78	76.3	16.2	138	135.0	28.7	198	193.7	41.2	258	252.4	53.6
19	18.6	04.0	79	77.3	16.4	139	136.0	28.9	199	194.7	41.4	259	253.3	53.8
20	19.6	04.2	80	78.3	16.6	140	136.9	29.1	200	195.6	41.6	260	254.3	54.1
21	20.5	04.4	81	79.2	16.8	141	137.9	29.3	201	196.6	41.8	261	255.3	54.3
22	21.5	04.6	82	80.2	17.0	142	138.9	29.5	202	197.6	42.0	262	256.3	54.5
23	22.5	04.8	83	81.2	17.3	143	139.9	29.7	203	198.6	42.2	263	257.3	54.7
24	23.5	05.0	84	82.2	17.5	144	140.9	29.9	204	199.5	42.4	264	258.2	54.9
25	24.5	05.2	85	83.1	17.7	145	141.8	30.1	205	200.5	42.6	265	259.2	55.1
26	25.4	05.4	86	84.1	17.9	146	142.8	30.4	206	201.5	42.8	266	260.2	55.3
27	26.4	05.6	87	85.1	18.1	147	143.8	30.6	207	202.5	43.0	267	261.2	55.5
28	27.4	05.8	88	86.1	18.3	148	144.8	30.8	208	203.5	43.2	268	262.1	55.7
29	28.4	06.0	89	87.1	18.5	149	145.7	31.0	209	204.4	43.5	269	263.1	55.9
30	29.3	06.2	90	88.0	18.7	150	146.7	31.2	210	205.4	43.7	270	264.1	56.1
31	30.3	06.4	91	89.0	18.9	151	147.7	31.4	211	206.4	43.9	271	265.1	56.3
32	31.3	06.7	92	90.0	19.1	152	148.7	31.6	212	207.4	44.1	272	266.1	56.6
33	32.3	06.9	93	91.0	19.3	153	149.7	31.8	213	208.3	44.3	273	267.0	56.8
34	33.3	07.1	94	91.9	19.5	154	150.6	32.0	214	209.3	44.5	274	268.0	57.0
35	34.2	07.3	95	92.9	19.8	155	151.6	32.2	215	210.3	44.7	275	269.0	57.2
36	35.2	07.5	96	93.9	20.0	156	152.6	32.4	216	211.3	44.9	276	270.0	57.4
37	36.2	07.7	97	94.9	20.2	157	153.6	32.6	217	212.3	45.1	277	270.9	57.6
38	37.2	07.9	98	95.9	20.4	158	154.5	32.9	218	213.2	45.3	278	271.9	57.8
39	38.1	08.1	99	96.8	20.6	159	155.5	33.1	219	214.2	45.5	279	272.9	58.0
40	39.1	08.3	100	97.8	20.8	160	156.5	33.3	220	215.2	45.7	280	273.9	58.2
41	40.1	08.5	101	98.8	21.0	161	157.5	33.5	221	216.2	45.9	281	274.9	58.4
42	41.1	08.7	102	99.8	21.2	162	158.5	33.7	222	217.1	46.2	282	275.8	58.6
43	42.1	08.9	103	100.7	21.4	163	159.4	53.9	223	218.1	46.4	283	276.8	58.8
44	43.0	09.1	104	101.7	21.6	164	160.4	31.1	224	219.1	46.6	284	277.8	59.0
45	44.0	09.4	105	102.7	21.8	165	161.4	34.3	225	220.1	46.8	285	278.8	59.3
46	45.0	09.6	106	103.7	22.0	166	162.4	34.5	226	221.1	47.0	286	279.8	59.5
47	46.0	09.8	107	104.7	22.2	167	163.4	34.7	227	222.0	47.2	287	280.7	59.7
48	47.0	10.0	108	105.6	22.5	168	164.3	34.9	228	223.0	47.4	288	281.7	59.9
49	47.9	10.2	109	106.6	22.7	169	165.3	35.1	229	224.0	47.6	289	282.7	60.1
50	48.9	10.4	110	107.6	22.9	170	166.3	35.3	230	225.0	47.8	290	283.7	60.3
51	49.9	10.6	111	108.6	23.1	171	167.3	35.6	231	226.0	48.0	291	284.6	60.5
52	50.9	10.8	112	109.6	23.3	172	168.2	35.8	232	226.9	48.2	292	285.6	60.7
53	51.8	11.0	113	110.5	23.5	173	169.2	36.0	233	227.9	48.4	293	286.6	60.9
54	52.8	11.2	114	111.5	23.7	174	170.2	36.2	234	228.9	48.7	294	287.6	61.1
55	53.8	11.4	115	112.5	23.9	175	171.2	36.4	235	229.9	48.9	295	288.6	61.3
56	54.8	11.6	116	113.5	24.1	176	172.2	36.6	236	230.8	49.1	296	289.5	61.5
57	55.8	11.9	117	114.4	24.3	177	173.1	36.8	237	231.8	49.3	297	290.5	61.7
58	56.7	12.1	118	115.4	24.5	178	174.1	37.0	238	232.8	49.5	298	291.5	62.0
59	57.7	12.3	119	116.4	24.7	179	175.1	37.2	239	233.8	49.7	299	292.5	62.2
60	58.7	12.5	120	117.4	24.9	180	176.1	37.4	240	234.8	49.9	300	293.4	62.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 78 Degrees.

TABLE II. Difference of Latitude and Departure for 13 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.4	13.7	121	117.9	27.2	181	176.4	40.7	241	234.8	54.2
2	01.9	00.4	62	60.4	13.9	122	118.9	27.4	182	177.3	40.9	242	235.8	54.4
3	02.9	00.7	63	61.4	14.2	123	119.8	27.7	183	178.3	41.2	243	236.8	54.7
4	03.9	00.9	64	62.4	14.4	124	120.8	27.9	184	179.3	41.4	244	237.7	54.9
5	04.9	01.1	65	63.3	14.6	125	121.8	28.1	185	180.3	41.6	245	238.7	55.1
6	05.8	01.3	66	64.3	14.8	126	122.8	28.3	186	181.2	41.8	246	239.7	55.3
7	06.8	01.6	67	65.3	15.1	127	123.7	28.6	187	182.2	42.1	247	240.7	55.6
8	07.8	01.8	68	66.3	15.3	128	124.7	28.8	188	183.2	42.3	248	241.6	55.8
9	08.8	02.0	69	67.2	15.5	129	125.7	29.0	189	184.2	42.5	249	242.6	56.0
10	09.7	02.2	70	68.2	15.7	130	126.7	29.2	190	185.1	42.7	250	243.6	56.2
11	10.7	02.5	71	69.2	16.0	131	127.6	29.5	191	186.1	43.0	251	244.6	56.5
12	11.7	02.7	72	70.2	16.2	132	128.6	29.7	192	187.1	43.2	252	245.5	56.7
13	12.7	02.9	73	71.1	16.4	133	129.6	29.9	193	188.1	43.4	253	246.5	56.9
14	13.6	03.1	74	72.1	16.6	134	130.6	30.1	194	189.0	43.6	254	247.5	57.1
15	14.6	03.4	75	73.1	16.9	135	131.5	30.4	195	190.0	43.9	255	248.5	57.4
16	15.6	03.6	76	74.1	17.1	136	132.5	30.6	196	191.0	44.1	256	249.4	57.6
17	16.6	03.8	77	75.0	17.3	137	133.5	30.8	197	192.0	44.3	257	250.4	57.8
18	17.5	04.0	78	76.0	17.5	138	134.5	31.0	198	192.9	44.5	258	251.4	58.0
19	18.5	04.3	79	77.0	17.8	139	135.4	31.3	199	193.9	44.8	259	252.4	58.3
20	19.5	04.5	80	77.9	18.0	140	136.4	31.5	200	194.9	45.0	260	253.3	58.5
21	20.5	04.7	81	78.9	18.2	141	137.4	31.7	201	195.8	45.2	261	254.3	58.7
22	21.4	04.9	82	79.9	18.4	142	138.4	31.9	202	196.8	45.4	262	255.3	58.9
23	22.4	05.2	83	80.9	18.7	143	139.3	32.2	203	197.8	45.7	263	256.3	59.2
24	23.4	05.4	84	81.8	18.9	144	140.3	32.4	204	198.8	45.9	264	257.2	59.4
25	24.4	05.6	85	82.8	19.1	145	141.3	32.6	205	199.7	46.1	265	258.2	59.6
26	25.3	05.8	86	83.8	19.3	146	142.3	32.8	206	200.7	46.3	266	259.2	59.8
27	26.3	06.1	87	84.8	19.6	147	143.2	33.1	207	201.7	46.6	267	260.2	60.1
28	27.3	06.3	88	85.7	19.8	148	144.2	33.3	208	202.7	46.8	268	261.1	60.3
29	28.3	06.5	89	86.7	20.0	149	145.2	33.5	209	203.6	47.0	269	262.1	60.5
30	29.2	06.7	90	87.7	20.2	150	146.2	33.7	210	204.6	47.2	270	263.1	60.7
31	30.2	07.0	91	88.7	20.5	151	147.1	34.0	211	205.6	47.5	271	264.1	61.0
32	31.2	07.2	92	89.6	20.7	152	148.1	34.2	212	206.6	47.7	272	265.0	61.2
33	32.2	07.4	93	90.6	20.9	153	149.1	34.4	213	207.5	47.9	273	266.0	61.4
34	33.1	07.6	94	91.6	21.1	154	150.1	34.6	214	208.5	48.1	274	267.0	61.6
35	34.1	07.9	95	92.6	21.4	155	151.0	34.9	215	209.5	48.4	275	268.0	61.9
36	35.1	08.1	96	93.5	21.6	156	152.0	35.1	216	210.5	48.6	276	268.9	62.1
37	36.1	08.3	97	94.5	21.8	157	153.0	35.3	217	211.4	48.8	277	269.9	62.3
38	37.0	08.5	98	95.5	22.0	158	154.0	35.5	218	212.4	49.0	278	270.9	62.5
39	38.0	08.8	99	96.5	22.3	159	154.9	35.8	219	213.4	49.3	279	271.8	62.8
40	39.0	09.0	100	97.4	22.5	160	155.9	36.0	220	214.4	49.5	280	272.8	63.0
41	39.9	09.2	101	98.4	22.7	161	156.9	36.2	221	215.3	49.7	281	273.8	63.2
42	40.9	09.4	102	99.4	22.9	162	157.8	36.4	222	216.3	49.9	282	274.8	63.4
43	41.9	09.7	103	100.4	23.2	163	158.8	36.7	223	217.3	50.2	283	275.7	63.7
44	42.9	09.9	104	101.3	23.4	164	159.8	36.9	224	218.3	50.4	284	276.7	63.9
45	43.8	10.1	105	102.3	23.6	165	160.8	37.1	225	219.2	50.6	285	277.7	64.1
46	44.8	10.3	106	103.3	23.8	166	161.7	37.3	226	220.2	50.8	286	278.7	64.3
47	45.8	10.6	107	104.3	24.1	167	162.7	37.6	227	221.2	51.1	287	279.6	64.6
48	46.8	10.8	108	105.2	24.3	168	163.7	37.8	228	222.2	51.3	288	280.6	64.8
49	47.7	11.0	109	106.2	24.5	169	164.7	38.0	229	223.1	51.5	289	281.6	65.0
50	48.7	10.2	110	107.2	24.7	170	165.6	38.2	230	224.1	51.7	290	282.6	65.2
51	49.7	11.5	111	108.2	25.0	171	166.6	38.5	231	225.1	52.0	291	283.5	65.5
52	50.7	11.7	112	109.1	25.2	172	167.6	38.7	232	226.1	52.2	292	284.5	65.7
53	51.6	11.9	113	110.1	25.4	173	168.6	38.9	233	227.0	52.4	293	285.5	65.9
54	52.6	12.1	114	111.1	25.6	174	169.5	39.1	234	228.0	52.6	294	286.5	66.1
55	53.6	12.4	115	112.1	25.9	175	170.5	39.4	235	229.0	52.9	295	287.4	66.4
56	54.6	12.6	116	113.0	26.1	176	171.5	39.6	236	230.0	53.1	296	288.4	66.6
57	55.5	12.8	117	114.0	26.3	177	172.5	39.8	237	230.9	53.3	297	289.4	66.8
58	56.5	13.0	118	115.0	26.5	178	173.4	40.0	238	231.9	53.5	298	290.4	67.0
59	57.5	13.3	119	116.0	26.8	179	174.4	40.3	239	232.9	53.8	299	291.3	67.3
60	58.5	13.5	120	116.9	27.0	180	175.4	40.5	240	233.8	54.0	300	292.3	67.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 77 Degrees.

TABLE II. Difference of Latitude and Departure for 14 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.2	61	59.2	14.8	121	117.4	29.3	181	175.6	43.8	241	233.8	58.3
2	01.9	00.5	62	60.2	15.0	122	118.4	29.5	182	176.6	44.0	242	234.8	58.5
3	02.9	00.7	63	61.1	15.2	123	119.3	29.8	183	177.6	44.3	243	235.8	58.8
4	03.9	01.0	64	62.1	15.5	124	120.3	30.0	184	178.5	44.5	244	236.8	59.0
5	04.9	01.2	65	63.1	15.7	125	121.3	30.2	185	179.5	44.8	245	237.7	59.3
6	05.8	01.5	66	64.0	16.0	126	122.3	30.5	186	180.5	45.0	246	238.7	59.5
7	06.8	01.7	67	65.0	16.2	127	123.2	30.7	187	181.4	45.2	247	239.7	59.8
8	07.8	01.9	68	66.0	16.5	128	124.2	31.0	188	182.4	45.5	248	240.6	60.0
9	08.7	02.2	69	67.0	16.7	129	125.2	31.2	189	183.4	45.7	249	241.6	60.2
10	09.7	02.4	70	67.9	16.9	130	126.1	31.4	190	184.4	46.0	250	242.6	60.5
11	10.7	02.7	71	68.9	17.2	131	127.1	31.7	191	185.3	46.2	251	243.5	60.7
12	11.6	02.9	72	69.9	17.4	132	128.1	31.9	192	186.3	46.4	252	244.5	61.0
13	12.6	03.1	73	70.8	17.7	133	129.0	32.2	193	187.3	46.7	253	245.5	61.2
14	13.6	03.4	74	71.8	17.9	134	130.0	32.4	194	188.2	46.9	254	246.5	61.4
15	14.6	03.6	75	72.8	18.1	135	131.0	32.7	195	189.2	47.2	255	247.4	61.7
16	15.5	03.9	76	73.7	18.4	136	132.0	32.9	196	190.2	47.4	256	248.4	61.9
17	16.5	04.1	77	74.7	18.6	137	132.9	33.1	197	191.1	47.7	257	249.4	62.2
18	17.5	04.4	78	75.7	18.9	138	133.9	33.4	198	192.1	47.9	258	250.3	62.4
19	18.4	04.6	79	76.7	19.1	139	134.9	33.6	199	193.1	48.1	259	251.3	62.7
20	19.4	04.8	80	77.6	19.4	140	135.8	33.9	200	194.1	48.4	260	252.3	62.9
21	20.4	05.1	81	78.6	19.6	141	136.8	34.1	201	195.0	48.6	261	253.2	63.1
22	21.3	05.3	82	79.6	19.8	142	137.8	34.4	202	196.0	48.9	262	254.2	63.4
23	22.3	05.6	83	80.5	20.1	143	138.8	34.6	203	197.0	49.1	263	255.2	63.6
24	23.3	05.8	84	81.5	20.3	144	139.7	34.8	204	197.9	49.4	264	256.2	63.9
25	24.3	06.0	85	82.5	20.6	145	140.7	35.1	205	198.9	49.6	265	257.1	64.1
26	25.2	06.3	86	83.4	20.8	146	141.7	35.3	206	199.9	49.8	266	258.1	64.4
27	26.2	06.5	87	84.4	21.0	147	142.6	35.6	207	200.9	50.1	267	259.1	64.6
28	27.2	06.8	88	85.4	21.3	148	143.6	35.8	208	201.8	50.3	268	260.0	64.8
29	28.1	07.0	89	86.4	21.5	149	144.6	36.0	209	202.8	50.6	269	261.0	65.1
30	29.1	07.3	90	87.3	21.8	150	145.5	36.3	210	203.8	50.8	270	262.0	65.3
31	30.1	07.5	91	88.3	22.0	151	146.5	36.5	211	204.7	51.0	271	263.0	65.6
32	31.0	07.7	92	89.3	22.3	152	147.5	36.8	212	205.7	51.3	272	263.9	65.8
33	32.0	08.0	93	90.2	22.5	153	148.5	37.0	213	206.7	51.5	273	264.9	66.0
34	33.0	08.2	94	91.2	22.7	154	149.4	37.3	214	207.6	51.8	274	265.9	66.3
35	34.0	08.5	95	92.2	23.0	155	150.4	37.5	215	208.6	52.0	275	266.8	66.5
36	34.9	08.7	96	93.1	23.2	156	151.4	37.7	216	209.6	52.3	276	267.8	66.8
37	35.9	09.0	97	94.1	23.5	157	152.3	38.0	217	210.6	52.5	277	268.8	67.0
38	36.9	09.2	98	95.1	23.7	158	153.3	38.2	218	211.5	52.7	278	269.7	67.3
39	37.8	09.4	99	96.1	24.0	159	154.3	38.5	219	212.5	53.0	279	270.7	67.5
40	38.8	09.7	100	97.0	24.2	160	155.2	38.7	220	213.5	53.2	280	271.7	67.7
41	39.8	09.9	101	98.0	24.4	161	156.2	38.9	221	214.4	53.5	281	272.7	68.0
42	40.8	10.2	102	99.0	24.7	162	157.2	39.2	222	215.4	53.7	282	273.6	68.2
43	41.7	10.4	103	99.9	24.9	163	158.2	39.4	223	216.4	53.9	283	274.6	68.5
44	42.7	10.6	104	100.9	25.2	164	159.1	39.7	224	217.3	54.2	284	275.6	68.7
45	43.7	10.9	105	101.9	25.4	165	160.1	39.9	225	218.3	54.4	285	276.5	68.9
46	44.6	11.1	106	102.9	25.6	166	161.1	40.2	226	219.3	54.7	286	277.5	69.2
47	45.6	11.4	107	103.8	25.9	167	162.0	40.4	227	220.3	54.9	287	278.5	69.4
48	46.6	11.6	108	104.8	26.1	168	163.0	40.6	228	221.2	55.2	288	279.4	69.7
49	47.5	11.9	109	105.8	26.4	169	164.0	40.9	229	222.2	55.4	289	280.4	69.9
50	48.5	12.1	110	106.7	26.6	170	165.0	41.1	230	223.2	55.6	290	281.4	70.2
51	49.5	12.3	111	107.7	26.9	171	165.9	41.4	231	224.1	55.9	291	282.4	70.4
52	50.5	12.6	112	108.7	27.1	172	166.9	41.6	232	225.1	56.1	292	283.3	70.6
53	51.4	12.8	113	109.6	27.3	173	167.9	41.9	233	226.1	56.4	293	284.3	70.9
54	52.4	13.1	114	110.6	27.6	174	168.8	42.1	234	227.0	56.6	294	285.3	71.1
55	53.4	13.3	115	111.6	27.8	175	169.8	42.3	235	228.0	56.9	295	286.2	71.4
56	54.3	13.5	116	112.6	28.1	176	170.8	42.6	236	229.0	57.1	296	287.2	71.6
57	55.3	13.8	117	113.5	28.3	177	171.7	42.8	237	230.0	57.3	297	288.2	71.9
58	56.3	14.0	118	114.5	28.6	178	172.7	43.1	238	230.9	57.6	298	289.1	72.1
59	57.2	14.3	119	115.5	28.8	179	173.7	43.3	239	231.9	57.8	299	290.1	72.3
60	58.2	14.5	120	116.4	29.0	180	174.7	43.5	240	232.9	58.1	300	291.1	72.6
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 76 Degrees.

TABLE II. Difference of Latitude and Departure for 15 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.3	61	58.9	15.8	121	116.9	31.3	181	174.8	46.8	241	232.8	62.4
2	01.9	00.5	62	59.9	16.0	122	117.8	31.6	182	175.8	47.1	242	233.8	62.6
3	02.9	00.8	63	60.9	16.3	123	118.8	31.8	183	176.8	47.4	243	234.7	62.9
4	03.9	01.0	64	61.8	16.6	124	119.8	32.1	184	177.7	47.6	244	235.7	63.2
5	04.8	01.3	65	62.8	16.8	125	120.7	32.4	185	178.7	47.9	245	236.7	63.4
6	05.8	01.6	66	63.8	17.1	126	121.7	32.6	186	179.7	48.1	246	237.6	63.7
7	06.8	01.8	67	64.7	17.3	127	122.7	32.9	187	180.6	48.4	247	238.6	63.9
8	07.7	02.1	68	65.7	17.6	128	123.6	33.1	188	181.6	48.7	248	239.5	64.2
9	08.7	02.3	69	66.6	17.9	129	124.6	33.4	189	182.6	48.9	249	240.5	64.4
10	09.7	02.6	70	67.6	18.1	130	125.6	33.6	190	183.5	49.2	250	241.5	64.7
11	10.6	02.8	71	68.6	18.4	131	126.5	33.9	191	184.5	49.4	251	242.4	65.0
12	11.6	03.1	72	69.5	18.6	132	127.5	34.2	192	185.5	49.7	252	243.4	65.2
13	12.6	03.4	73	70.5	18.9	133	128.5	34.4	193	186.4	50.0	253	244.4	65.5
14	13.5	03.6	74	71.5	19.2	134	129.4	34.7	194	187.4	50.2	254	245.3	65.7
15	14.5	03.9	75	72.4	19.4	135	130.4	34.9	195	188.4	50.5	255	246.3	66.0
16	15.5	04.1	76	73.4	19.7	136	131.4	35.2	196	189.3	50.7	256	247.3	66.3
17	16.4	04.4	77	74.4	19.9	137	132.3	35.5	197	190.3	51.0	257	248.2	66.5
18	17.4	04.7	78	75.3	20.2	138	133.3	35.7	198	191.3	51.2	258	249.2	66.8
19	18.4	04.9	79	76.3	20.4	139	134.3	36.0	199	192.2	51.5	259	250.2	67.0
20	19.3	05.2	80	77.3	20.7	140	135.2	36.2	200	193.2	51.8	260	251.1	67.3
21	20.3	05.4	81	78.2	21.0	141	136.2	36.5	201	194.2	52.0	261	252.1	67.6
22	21.3	05.7	82	79.2	21.2	142	137.2	36.8	202	195.1	52.3	262	253.1	67.8
23	22.2	06.0	83	80.2	21.5	143	138.1	37.0	203	196.1	52.5	263	254.0	68.1
24	23.2	06.2	84	81.1	21.7	144	139.1	37.3	204	197.0	52.8	264	255.0	68.3
25	24.1	06.5	85	82.1	22.0	145	140.1	37.5	205	198.0	53.1	265	256.0	68.6
26	25.1	06.7	86	83.1	22.3	146	141.0	37.8	206	199.0	53.3	266	256.9	68.8
27	26.1	07.0	87	84.0	22.5	147	142.0	38.0	207	199.9	53.6	267	257.9	69.1
28	27.0	07.2	88	85.0	22.8	148	143.0	38.3	208	200.9	53.8	268	258.9	69.4
29	28.0	07.5	89	86.0	23.0	149	143.9	38.6	209	201.9	54.1	269	259.8	69.6
30	29.0	07.8	90	86.9	23.3	150	144.9	38.8	210	202.8	54.4	270	260.8	69.9
31	29.9	08.0	91	87.9	23.6	151	145.9	39.1	211	203.8	54.6	271	261.8	70.1
32	30.9	08.3	92	88.9	23.8	152	146.8	39.3	212	204.8	54.9	272	262.7	70.4
33	31.9	08.5	93	89.8	24.1	153	147.8	39.6	213	205.7	55.1	273	263.7	70.7
34	32.8	08.8	94	90.8	24.3	154	148·8	39.9	214	206.7	55.4	274	264.7	70.9
35	33.8	09.1	95	91.8	24.6	155	149.7	40.1	215	207.7	55.6	275	265.6	71.2
36	34.8	09.3	96	92.7	24.8	156	150.7	40.4	216	208.6	55.9	276	266.6	71.4
37	35.7	09.6	97	93.7	25.1	157	151.7	40.6	217	209.6	56.2	277	267.6	71.7
38	36.7	09.8	98	94.7	25.4	158	152.6	40.9	218	210.6	56.4	278	268.5	72.0
39	37.7	10.1	99	95.6	25.6	159	153.6	41.2	219	211.5	56.7	279	269.5	72.2
40	38.6	10.4	100	96.6	25.9	160	154.5	41.4	220	212.5	56.9	280	270.5	72.5
41	39.6	10.6	101	97.6	26.1	161	155.5	41.7	221	213.5	57.2	281	271.4	72.7
42	40.6	10.9	102	98.5	26.4	162	156.5	41.9	222	214.4	57.5	282	272.4	73.0
43	41.5	11.1	103	99.5	26.7	163	157.4	42.2	223	215.4	57.7	283	273.4	73.2
44	42.5	11.4	104	100.5	26.9	164	158.4	42.4	224	216.4	58.0	284	274.3	73.5
45	43.5	11.6	105	101.4	27.2	165	159.4	42.7	225	217.3	58.2	285	275.3	73.8
46	44.4	11.9	106	102.4	27.4	166	160.3	43.0	226	218.3	58.5	286	276.3	74.0
47	45.4	12.2	107	103.4	27.7	167	161.3	43.2	227	219.3	58.8	287	277.2	74.3
48	46.4	12.4	108	104.3	28.0	168	162.3	43.5	228	220.2	59.0	288	278.2	74.5
49	47.3	12.7	109	105.3	28.2	169	163.2	43.7	229	221.2	59.3	289	279.2	74.8
50	48.3	12.9	110	106.3	28.5	170	164.2	44.0	230	222.2	59.5	290	280.1	75.1
51	49.3	13.2	111	107.2	28.7	171	165.2	44.3	231	223.1	59.8	291	281.1	75.3
52	50.2	13.5	112	108.2	29.0	172	166.1	44.5	232	224.1	60.0	292	282.1	75.6
53	51.2	13.7	113	109.1	29.2	173	167.1	44.8	233	225.1	60.3	293	283.0	75.8
54	52.2	14.0	114	119.1	29.5	174	168.1	45.0	234	226.0	60.6	294	284.0	76.1
55	53.1	14.2	115	111.1	29.8	175	169.0	45.3	235	227.0	60.8	295	284.9	76.4
56	54.1	14.5	116	112.0	30.0	176	170.0	45.6	236	228.0	61.1	296	285.9	76.6
57	55.1	14.8	117	113.0	30.3	177	171.0	45.8	237	228.9	61.3	297	286.9	76.9
58	56.0	15.0	118	114.0	30.5	178	171.9	46.1	238	229.9	61.6	298	287.8	77.1
59	57.0	15.3	119	114.9	30.8	179	172.9	46.3	239	230.9	61.9	299	288.8	77.4
60	58.0	15.5	120	115.9	31.1	180	173.9	46.6	240	231.8	62.1	300	289.8	77.6
Dist	Dep	Lat.	Dist	Dep	Lat,	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 75 Degrees.

TABLE II. Difference of Latitude and Departure for 16 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.3	61	58.6	16.8	121	116.3	33.4	181	174.0	49.9	241	231.7	66.4
2	01.9	00.6	62	59.6	17.1	122	117.3	33.6	182	174.9	50.2	242	232.6	66.7
3	02.9	00.8	63	60.6	17.4	123	118.2	33.9	183	175.9	50.4	243	233.6	67.0
4	03.8	01.1	64	61.5	17.6	124	119.2	34.2	184	176.9	50.7	244	234.5	67.3
5	04.8	01.4	65	62.5	17.9	125	120.2	34.5	185	177.8	51.0	245	235.5	67.5
6	05.8	01.7	66	63.4	18.2	126	121.1	34.7	186	178.8	51.3	246	236.5	67.8
7	06.7	01.9	67	64.4	18.5	127	122.1	35.0	187	179.8	51.5	247	237.4	68.1
8	07.7	02.2	68	65.4	18.7	128	123.0	35.3	188	180.7	51.8	248	238.4	68.4
9	08.7	02.5	69	66.3	19.0	129	124.0	35.6	189	181.7	52.1	249	239.4	68.6
10	09.6	02.8	70	67.3	19.3	130	125.0	35.8	190	182.6	52.4	250	240.3	68.9
11	10.6	03.0	71	68.2	19.6	131	125.9	36.1	191	183.6	52.6	251	241.3	69.2
12	11.5	03.3	72	69.2	19.8	132	126.9	36.4	192	184.6	52.9	252	242.2	69.5
13	12 5	03.6	73	70.2	20.1	133	127.8	36.7	193	185.5	53.2	253	243.2	69.7
14	13.5	03.9	74	71.1	20.4	134	128.8	36.9	194	186.5	53.5	254	244.2	70.0
15	14.4	04.1	75	72.1	20.7	135	129.8	37.2	195	187.4	53.7	255	245.1	70.3
16	15.4	04.4	76	73.1	20.9	136	130.7	37.5	196	188.4	54.0	256	246.1	70.6
17	16.3	04.7	77	74.0	21.2	137	131.7	37.8	197	189.4	54.3	257	247.0	70.8
18	17.3	05.0	78	75.0	21.5	138	132.7	38.0	198	190.3	54.6	258	248.0	71.1
19	18.3	05.2	79	75.9	21.8	139	133.6	38.3	199	191.3	54.9	259	249.0	71.4
20	19.2	05.5	80	76.9	22.1	140	134.6	38.6	200	192.3	55.1	260	249.9	71.7
21	20.2	05.8	81	77.9	22.3	141	135.5	38.9	201	193.2	55.4	261	250.9	71.9
22	21.1	06.1	82	78.8	22.6	142	136.5	39.1	202	194.2	55.7	262	251.9	72.2
23	22.1	06.3	83	79.8	22.9	143	137.5	39.4	203	195.1	56.0	263	252.8	72.5
24	23.1	06.6	84	80.7	23.2	144	138.4	39.7	204	196.1	56.2	264	253.8	72.8
25	24.0	06.9	85	81.7	23.4	145	139.4	40.0	205	197.1	56.5	265	254.7	73.0
26	25.0	07.2	86	82.7	23.7	146	140.3	40.2	206	198.0	56.8	266	255.7	73.3
27	26.0	07.4	87	83.6	24.0	147	141.3	40.5	207	199.0	57.1	267	256.7	73.6
28	26.9	07.7	88	84.6	24.3	148	142.3	40.8	208	199.9	57.3	268	257.6	73.9
29	27.9	08.0	89	85.6	24.5	149	143.2	41.1	209	200.9	57.6	269	258.6	74.1
30	28.8	08.3	90	86.5	24.8	150	144.2	41.3	210	201.9	57.9	270	259.5	74.4
31	29.8	08.5	91	87.5	25.1	151	145.2	41.6	211	202.8	58.2	271	260.5	74.7
32	30.8	08.8	92	88.4	25.4	152	146.1	41.9	212	203.8	58.4	272	261.5	75.0
33	31.7	09.1	93	89.4	25.6	153	147.1	42.2	213	204.7	58.7	273	262.4	75.2
34	32.7	09.4	94	90.4	25.9	154	148.0	42.4	214	205.7	59.0	274	263.4	75.5
35	33.6	09.6	95	91.3	26.2	155	149.0	42.7	215	206.7	59.3	275	264.3	75.8
36	34.6	09.9	96	92.3	26.5	156	150.0	43.0	216	207.6	59.5	276	265.3	76.1
37	35.6	10.2	97	93.2	26.7	157	150.9	43.3	217	208.6	59.8	277	266.3	76.4
38	36.5	10.5	98	94.2	27·0	158	151.9	43.6	218	209.6	60.1	278	267.2	76.6
39	37.5	10.7	99	95.2	27.3	159	152.8	43.8	219	210.5	60.4	279	268.2	76.9
40	38.5	11.0	100	96.1	27.6	160	153.8	44.1	220	211.5	60.6	280	269.2	77.2
41	39.4	11.3	101	97.1	27.8	161	154.8	44.4	221	212.4	60.9	281	270.1	77.5
42	40.4	11.6	102	98.0	28.1	162	155.7	44.7	222	213.4	61.2	282	271.1	77.7
43	41.3	11.9	103	99.0	28.4	163	156.7	44.9	223	214.4	61.5	283	272.0	78.0
44	42.3	12.1	104	100.0	28.7	164	157.6	45.2	224	215.3	61.7	284	273.0	78.3
45	43.3	12.4	105	100.9	28.9	165	158.6	45.5	225	216.3	62.0	285	274.0	78.6
46	44.2	12.7	106	101.9	29.2	166	159.6	45.8	226	217.2	62.3	286	274.9	78.8
47	45.2	13.0	107	102.9	29.5	167	160.5	46.0	227	218.2	62.6	287	275.9	79.1
48	46.1	13.2	108	103.8	29.8	168	161.5	46.3	228	219.2	62.8	288	276.8	79.4
49	47.1	13.5	109	104.8	30.0	169	162.5	46.6	229	220.1	63.1	289	277.8	79.7
50	48.1	13.8	110	105.7	30.3	170	163.4	46.9	230	221.1	63.4	290	278.8	79.9
51	49.0	14.1	111	106.7	30.6	171	164.4	47.1	231	222.1	63.7	291	279.7	80.2
52	50.0	14.3	112	107.7	30.9	172	165.3	47.4	232	223.0	63.9	292	280.7	80.5
53	50.9	14.6	113	108.6	31.1	173	166.3	47.7	233	224.0	64.2	293	281.6	80.8
54	51.9	14.9	114	109.6	31.4	174	167.3	48.0	234	224.9	64.5	294	282.6	81.0
55	52.9	15.2	115	110.5	31.7	175	168.2	48.2	235	225.9	64.8	295	283.6	81.3
56	53.9	15.4	116	111.5	32.0	176	169.2	48.5	236	226.9	65.1	296	284.5	81.6
57	54.8	15.7	117	112.5	32.2	177	170.1	48.8	237	227.8	65.3	297	285.5	81.9
58	55.8	16.0	118	113.4	32.5	178	171.1	49.1	238	228.8	65.6	298	286.5	82.1
59	56.8	16.3	119	114.4	32.8	179	172.1	49.3	239	229.7	65.9	299	287.4	82.4
60	57.7	16.5	120	115.4	33.1	180	173.0	49.6	240	230.7	66.2	300	288.4	82.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 74 Degrees.

TABLE II. Difference of Latitude and Departure for 17 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat,	Dep	Dist	Lat.	Dep
1	01.0	00.3	61	58.3	17.8	121	115.7	35.4	181	173.1	52.9	241	230.5	70.5
2	01.9	00.6	62	59.3	18.1	122	116.7	35.7	182	174.0	53.2	242	231.4	70.8
3	02.9	00.9	63	60.2	18.4	123	117.6	36.0	183	175.0	53.5	243	232.4	71.0
4	03.8	01.2	64	61.2	18.7	124	118.6	36.3	184	176.0	53.8	244	233.3	71.3
5	04.8	01.5	65	62.2	19.0	125	119.5	36.5	185	176.9	54.1	245	234.3	71.6
6	05.7	01.8	66	63.1	19.3	126	120.5	36.8	186	177.9	54.4	246	235.3	71.9
7	06.7	02.0	67	64.1	19.6	127	121.5	37.1	187	178.8	54.7	247	236.2	72.2
8	07.7	02.3	68	65.0	19.9	128	122.4	37.4	188	179.8	55.0	248	237.2	72.5
9	08.6	02.6	69	66.0	20.2	129	123.4	37.7	189	180.7	55.3	249	238.1	72.8
10	09.6	02.9	70	66.9	20.5	130	124.3	38.0	190	181.7	55.6	250	239.1	73.1
11	10.5	03.2	71	67.9	20.8	131	125.3	38.3	191	182.7	55.8	251	240.0	73.4
12	11.5	03.5	72	68.9	21.1	132	126.2	38.6	192	183.6	56.1	252	241.0	73.7
13	12.4	03.8	73	69.8	21.3	133	127.2	38.9	193	184.6	56.4	253	241.9	74.0
14	13.4	04.1	74	70.8	21.6	134	128.1	39.2	194	185.5	56.7	254	242.9	74.3
15	14.3	04.4	75	71.7	21.9	135	129.1	39.5	195	186.5	57.0	255	243.9	74.6
16	15.3	04.7	76	72.7	22.2	136	130.1	39.8	196	187.4	57.3	256	244.8	74.8
17	16.3	05.0	77	73.6	22.5	137	131.0	40.1	197	188.4	57.6	257	245.8	75.1
18	17.2	05.3	78	74.6	22.8	138	132.0	40.3	198	189.3	57.9	258	246.7	75.4
19	18.2	05.6	79	75.5	23.1	139	132.9	40.6	199	190.3	58.2	259	247.7	75.7
20	19.1	05.8	80	76.5	23.4	140	133.9	40.9	200	191.3	58.5	260	248·6	76.0
21	20.1	06.1	81	77.5	23.7	141	134.8	41.2	201	192.2	58.8	261	249.6	76.3
22	21.0	06.4	82	78.4	24.0	142	135.8	41.5	202	193.2	59.1	262	250.6	76.6
23	22.0	06.7	83	79.4	24.3	143	136.8	41.8	203	194.1	59.4	263	251.5	76.9
24	23.0	07.0	84	80.3	24.6	144	137.7	42.1	204	195.1	59.6	264	252.5	77.2
25	23.9	07.3	85	81.3	24.9	145	138.7	42.4	205	196.0	59.9	265	253.4	77.5
26	24.9	07.6	86	82.2	25.1	146	139.6	42.7	206	197.0	60.2	266	254.4	77.8
27	25.8	07.9	87	83.2	25.4	147	140.6	43.0	207	198.0	60.5	267	255.3	73.1
28	26.8	08.2	88	84.2	25.7	148	141.5	43.3	208	198.9	60·8	268	256.3	78.4
29	27.7	08.5	89	85.1	26.0	149	142.5	43.6	209	199.9	61.1	269	257.2	78.6
30	28.7	08.8	90	86.1	26.3	150	143.4	43.9	210	200.8	61.4	270	258.2	78.9
31	29.6	09.1	91	87.0	26.6	151	144.4	44.1	211	201.8	61.7	271	259.2	79.2
32	30.6	09.4	92	88.0	26.9	152	145.4	44.4	212	202.7	62.0	272	260.1	79.5
33	31.6	09.6	93	88.9	27.2	153	146.3	44.7	213	203.7	62.3	273	261.1	79.8
34	32.5	09.9	94	89.9	27.5	154	147.3	45.0	214	204.6	62.6	274	262.0	80.1
35	33.5	10.2	95	90.8	27.8	155	148.2	45.3	215	205.6	62.9	275	263.0	80.4
36	34.4	10.5	96	91.8	28.1	156	149.2	45.6	216	206.6	63.2	276	263.9	80.7
37	35.4	10.8	97	92.8	28.4	157	150.1	45.9	217	207.5	63.4	277	264.9	81.0
38	36.3	11.1	98	93.7	28.7	158	151.1	46.2	218	208.5	63.7	278	265.9	81.3
39	37.3	11.4	99	94.7	28.9	159	152.1	46.5	219	209.4	64.0	279	266.8	81.6
40	38.3	11.7	100	95.6	29.2	160	153.0	46.8	220	210.4	64.3	280	267.8	81.9
41	39.2	12.0	101	96.6	29.5	161	154.0	47.1	221	211.3	64.6	281	268.7	82.2
42	40.2	12.3	102	97.5	29.8	162	154.9	47.4	222	212.3	64.9	282	269.7	82.4
43	41.1	12.6	103	98.5	30.1	163	155.9	47.7	223	213.3	65.2	283	270.6	82.7
44	42.1	12.9	104	99.5	30.4	164	156.8	47.9	224	214.2	65.5	284	271.6	83.0
45	43.0	13.2	105	100.4	30.7	165	157.8	48.2	225	215.2	65.8	285	272.5	83.3
46	44.0	13.4	106	101.4	31.0	166	158.7	48.5	226	216.1	66.1	286	273.5	83.6
47	44.9	13.7	107	102.3	31.3	167	159.7	48.8	227	217.1	66.4	287	274.5	83.9
48	45.9	14.0	108	103.3	31.6	168	160.7	49.1	228	218.0	66.7	288	275.4	84.2
49	46.9	14.3	109	104.2	31.9	169	161.6	49.4	229	219.0	67.0	289	276.4	84.5
50	47.8	14.6	110	105.2	32.2	170	162.6	49.7	230	220.0	67.2	290	277.3	84.8
51	48.8	14.9	111	106.1	32.5	171	163.5	50.0	231	220.9	67.5	291	278.3	85.1
52	49.7	15.2	112	107.1	32.7	172	164.5	50.3	232	221.9	67.8	292	279.2	85.4
53	50.7	15.5	113	108.1	33.0	173	165.4	50.6	233	222.8	68.1	293	280.2	85.7
54	51.6	15.8	114	109.0	33.3	174	166.4	50.9	234	223.8	68.4	294	281.2	86.0
55	52.6	16.1	115	110.0	33.6	175	167.4	51.2	235	224.7	68.7	295	282.1	86.2
56	53.6	16.4	116	110.9	33.9	176	168.3	51.5	236	225.7	69.0	296	283.1	86.5
57	54.5	16.7	117	111.9	34.2	177	169.3	51.7	237	226.6	69.3	297	284.0	86.8
58	55.5	17.0	118	112.8	34.5	178	170.2	52.0	238	227.6	69.6	298	285.0	87.1
59	56.4	17.2	119	113.8	34.8	179	171.2	52.3	239	228.6	69.9	299	285.9	87.4
60	57.4	17.5	120	114.8	35.1	180	172.1	52.6	240	229.5	70.2	300	286.9	87.7
Dist	Dep	Lat,	Dist	Dep	Lat,	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

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For 73 Degrees.

TABLE II. Difference of Latitude and Departure for 18 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	01.0	00.3	61	58.0	18.9	121	115.1	37.4	181	172.1	55.9	241	229.2	74.5
2	01.9	00.6	62	59.0	19.2	122	116.0	37.7	182	173.1	56.2	242	230.2	74.8
3	02.9	00.9	63	59.9	19.5	123	117.0	38.0	183	174.0	56.6	243	231.1	75.1
4	03.8	01.2	64	60.9	19.8	124	117.9	38.3	184	175.0	56.9	244	232.1	75.4
5	04.8	01.5	65	61.8	20.1	125	118.9	38.6	185	175.9	57.2	245	233.0	75.7
6	05.7	01.9	66	62.8	20.4	126	119.8	38.9	186	176.9	57.5	246	234.0	76.0
7	06.7	02.2	67	63.7	20.7	127	120.8	39.2	187	177.8	57.8	247	234.9	76.3
8	07.6	02.5	68	64.7	21.0	128	121.7	39.6	188	178.8	58.1	248	235.9	76.6
9	08.6	02.8	69	65.6	21.3	129	122.7	39.9	189	179.7	58.4	249	236.8	76.9
10	09.5	03.1	70	66.6	21.6	130	123.6	40.2	190	180.7	58.7	250	237.8	77.3
11	10.5	03·4	71	67.5	21.9	131	124.6	40.5	191	181.7	59.0	251	238.7	77.6
12	11.4	03.7	72	68.5	22.2	132	125.5	40.8	192	182.6	59.3	252	239.7	77.9
13	12.4	04.0	73	69.4	22.6	133	126.5	41.1	193	183.6	59.6	253	240.6	78.2
14	13.3	04.3	74	70.4	22.9	134	127.4	41.4	194	184.5	59.9	254	241.6	78.5
15	14.3	04.6	75	71.3	23.2	135	128.4	41.7	195	185.5	60.3	255	242.5	78.8
16	15.2	04.9	76	72.3	23.5	136	129.3	42.0	196	186.4	60.6	256	243.5	79.1
17	16.2	05.3	77	73.2	23.8	137	130.3	42.3	197	187.4	60.9	257	244.4	79.4
18	17.1	05.6	78	74.2	24.1	138	131.2	42.6	198	188.3	61.2	258	245.4	79.7
19	18.1	05.9	79	75.1	24.4	139	132.2	43.0	199	189.3	61.5	259	246.3	80.0
20	19.0	06.2	80	76.1	24.7	140	133.1	43.3	200	190.2	61.8	260	247.3	80.3
21	20.0	06.5	81	77.0	25.0	141	134.1	43.6	201	191.2	62.1	261	248.2	80.7
22	20.9	06.8	82	78.0	25.3	142	135.1	43.9	202	192.1	62.4	262	249.2	81.0
23	21.9	07.1	83	78.9	25.6	143	136.0	44.2	203	193.1	62.7	263	250.1	81.3
24	22.8	07.4	84	79.9	26.0	144	137.0	44.5	204	194.0	63.0	264	251.1	81.6
25	23.8	07.7	85	80.8	26.3	145	137.9	44.8	205	195.0	63.3	265	252.0	81.9
26	24.7	08.0	86	81.8	26.6	146	138.9	45.1	206	195.9	63.7	266	253.0	82.2
27	25.7	08.3	87	82.7	26.9	147	139.8	45.4	207	196.9	64.0	267	253.9	82.5
28	26.6	08.7	88	83.7	27.2	148	140.8	45.7	208	197.8	64.3	268	254.9	82.8
29	27.6	09.0	89	84.6	27.5	149	141.7	46.0	209	198.8	64.6	269	255.8	83.1
30	28.5	09.3	90	85.6	27.8	150	142.7	46.4	210	199.7	64.9	270	256.8	83.4
31	29.5	09.6	91	86.5	28.1	151	143.6	46.7	211	200.7	65.2	271	257.7	83.7
32	30.4	09.9	92	87.5	28.4	152	144.6	47.0	212	201.6	65.5	272	258.7	84.1
33	31.4	10.2	93	88.4	28.7	153	145.5	47.3	213	202.6	65.8	273	259.6	84.4
34	32.3	10.5	94	89.4	29.0	154	146·5	47.6	214	203.5	66.1	274	260.6	84.7
35	33.3	10.8	95	90.4	29.4	155	147.4	47.9	215	204.5	66.4	275	261.5	85.0
36	34.2	11.1	96	91.3	29.7	156	148.4	48.2	216	205.4	66.7	276	262.5	85.3
37	35.2	11.4	97	92.3	30.0	157	149.3	48.5	217	206.4	67.1	277	263.4	85.6
38	36.1	11.7	98	93.2	30.3	158	150.3	48.8	218	207.3	67.4	278	264.4	85.9
39	37.1	12.1	99	94.2	30.6	159	151.2	49.1	219	208.3	67.7	279	265.3	86.2
40	38.0	12.4	100	95.1	30.9	160	152.2	49.4	220	209.2	68.0	280	266.3	86.5
41	39.0	12.7	101	96.1	31.2	161	153.1	49.8	221	210.2	68.3	281	267.2	86.8
42	39.9	13.0	102	97.0	31.5	162	154.1	50.1	222	211.1	68.6	282	268.2	87.1
43	40.9	13.3	103	98.0	31.8	163	155.0	50.4	223	212.1	68.9	283	269.1	87.5
44	41.8	13.6	104	98.9	32.1	164	156.0	50.7	224	213.0	69.2	284	270.1	87.8
45	42.8	13.9	105	99.9	32.4	165	156.9	51.0	225	214.0	69.5	285	271.1	88.1
46	43.7	14.2	106	100.8	32.8	166	157.9	51.3	226	214.9	69.8	286	272.0	88.4
47	44.7	14.5	107	101.8	33.1	167	158.8	51.6	227	215.9	70.1	287	273.0	88.7
48	45.7	14.8	108	102.7	33.4	168	159.8	51.9	228	216.8	70.5	288	273.9	89.0
49	46.6	15.1	109	103.7	33.7	169	160.7	52.2	229	217.8	70.8	289	274.9	89.3
50	47.6	15.5	110	104.6	34.0	170	161.7	52.5	230	218.7	71.1	290	275.8	89.6
51	48.5	15.8	111	105.6	34.3	171	162.6	52.8	231	219.7	71.4	291	276.8	89.9
52	49.5	16.1	112	106.5	34.6	172	163.6	53.2	232	220.6	71.7	292	277.7	90.2
53	50.4	16.4	113	107.5	34.9	173	164.5	53.5	233	221.6	72.0	293	278.7	90.5
54	51.4	16.7	114	108.4	35.2	174	165.5	53.8	234	222.5	72.3	294	279.6	90.9
55	52.3	17.0	115	109.4	35.5	175	166.4	54.1	235	223.5	72.6	295	280.6	91.2
56	53.3	17.3	116	110.3	35.8	176	167.4	54.4	236	224.4	72.9	296	281.5	91.5
57	54.2	17.6	117	111.3	36.2	177	168.3	54.7	237	225.4	73.2	297	282.5	91.8
58	55.2	17.9	118	112.2	36.5	178	169.3	55.0	238	226.4	73.5	298	283.4	92.1
59	56.1	18.2	119	113.2	36.8	179	170.2	55.3	239	227.3	73.9	299	284.4	92.4
60	57.1	18.5	120	114.1	37.1	180	171.2	55.6	240	228.3	74.2	300	285.3	92.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 72 Degrees.

TABLE II. Difference of Latitude and Departure for 19 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep
1	00.9	00.3	61	57.7	19.9	121	114.4	39.4	181	171.1	58.9	241	227.9	78.5
2	01.9	00.7	62	58.6	20.2	122	115.4	39.7	182	172.1	59.3	242	228.8	78.8
3	02.8	01.0	63	59,6	20.5	123	116.3	40.0	183	173.0	59.6	243	229.8	79.1
4	03.8	01.3	64	60.5	20.8	124	117.2	40.4	184	174.0	59.9	244	230.7	79.4
5	04.7	01.6	65	61.5	21.2	125	118.2	40.7	185	174.9	60.2	245	231.7	79.8
6	05.7	02.0	66	62.4	21.5	126	119.1	41.0	186	175.9	60.6	246	232.6	80.1
7	06.6	02.3	67	63.3	21.8	127	120.1	41.3	187	176.8	60.9	247	233.5	80.4
8	07.6	02.6	68	64.3	22.1	128	121.0	41.7	188	177.8	61.2	248	234.5	80.7
9	08.5	02.9	69	65.2	22.5	129	122.0	42.0	189	178.7	61.5	249	235.4	81.1
10	09.5	03.3	70	66.2	22.8	130	122.9	42.3	190	179.6	61.9	250	236.4	81.4
11	10.4	03.6	71	67.1	23.1	131	123.9	42.6	191	180.6	62.2	251	237.3	81.7
12	11.3	03.9	72	68.1	23.4	132	124.8	43.0	192	181.5	62.5	252	238.3	82.0
13	12.3	04.2	73	69.0	23.8	133	125.8	43.3	193	182.5	62.8	253	239.2	82.4
14	13.2	04.6	74	70.0	24.1	134	126.7	43.6	194	183.4	63.2	254	240.2	82.7
15	14.2	04.9	75	70.9	24.4	135	127.6	44.0	195	184.4	63.5	255	241.1	83.0
16	15.1	05.2	76	71.9	24.7	136	128.6	44.3	196	185.3	63.8	356	242.1	83.3
17	16.1	05.5	77	72.8	25.1	137	129.5	44.6	197	186.3	64.1	257	243.0	83.7
18	17.0	05.9	78	73.8	25.4	138	130.5	44.9	198	187.2	64.5	258	243.9	84.0
19	18.0	06.2	79	74.7	25.7	139	131.4	45.3	199	188.2	64.8	259	244.9	84.3
20	18.9	06.5	80	75.6	26.0	140	132.4	45.6	200	189.1	65.1	260	245.8	84.6
21	19.9	06.8	81	76.6	26.4	141	133.3	45.9	201	190.0	65.4	261	246.8	85.0
22	20.8	07.2	82	77.5	26.7	142	134.3	46.2	202	191.0	65.8	262	247.7	85.3
23	21.7	07.5	83	78.5	27.0	143	135.2	46.6	203	191.9	66.1	263	248.7	85.6
24	22.7	07.8	84	79.4	27.3	144	136.2	46.9	204	192.9	66.4	264	249.6	86.0
25	23.6	08.1	85	80.4	27.7	145	137.1	47.2	205	193.8	66.7	265	250.6	86.3
26	24.6	08.5	86	81.3	28.0	146	138.0	47.5	206	194.8	67.1	266	251.5	86.6
27	25.5	08.8	87	82.3	28.3	147	139.0	47.9	207	195.7	67.4	267	252.5	86.9
28	26.5	09.1	88	83.2	28.7	148	139.9	48.2	208	196.7	67.7	268	253.4	87.3
29	27.4	09.4	89	84.2	29.0	149	140.9	48.5	209	197.6	68.0	269	254.3	87.6
30	28.4	09.8	90	85.1	29.3	150	141.8	48.8	210	198.6	68.4	270	255.3	87.9
31	29.3	10.1	91	86.0	29.6	151	142.8	49.2	211	199.5	68.7	271	256.2	88.2
32	30.3	10.4	92	87.0	30.0	152	143.7	49.5	212	200.4	69.0	272	257.2	88.6
33	31.2	10.7	93	87.9	30.3	153	144.7	49.8	213	201.4	69.3	273	258.1	88.9
34	32.1	11.1	94	88.9	30.6	154	145.6	50.1	214	202.3	69.7	274	259.1	89.2
35	33.1	11.4	95	89.8	30.9	155	146.6	50.5	215	203.3	70.0	275	260.0	89.5
36	34.0	11.7	96	90.8	31.3	156	147.5	50.8	216	204.2	70.3	276	261.0	89.9
37	35.0	12.0	97	91.7	31.6	157	148.4	51.1	217	205.2	70.6	277	261.9	90.2
38	35.9	12.4	98	92.7	31.9	158	149.4	51.4	218	206.1	71.0	278	262.9	90.5
39	36.9	12.7	99	93.6	32.2	159	150.3	51.8	219	207.1	71.3	279	263.8	90.8
40	37.8	13.0	100	94.6	32.6	160	151.3	52.1	220	208.0	71.6	280	264.7	91.2
41	38.8	13.3	101	95.5	32.9	161	152.2	52.4	221	209.0	72.0	281	265.7	91.5
42	39.7	13.7	102	96.4	33.2	162	153.2	52.7	222	209.9	72.3	282	266.6	91.8
43	40.7	14.0	103	97.4	33.5	163	154.1	53.1	223	210.9	72.6	283	267.6	92.1
44	41.6	14.3	104	98.3	33.9	164	155.1	53.4	224	211.8	72.9	284	268.5	92.5
45	42.5	14.7	105	99.3	34.2	165	156.0	53.7	225	212.7	73.3	285	269.5	92.8
46	43.5	15.0	106	100.2	34.5	166	157.0	54.0	226	213.7	73.6	286	270.4	93.1
47	44.4	15.3	107	101.2	34.8	167	157.9	54.4	227	214.6	73.9	287	271.4	93.4
48	45.4	15.6	108	102.1	35.2	168	158.8	54.7	228	215.6	74.2	288	272.3	93.8
49	46.3	16.0	109	103.1	35.5	169	159.8	55.0	229	216.5	74.6	289	273.3	94.1
50	47.3	16.3	110	104.0	35.8	170	160.7	55.3	230	217.5	74.9	290	274.2	94.4
51	48.2	16.6	111	105.0	36.1	171	161·7	55.7	231	218.4	75.2	291	275.1	94.7
52	49.2	16.9	112	105.9	36.5	172	162.6	56.0	232	219.4	75.5	292	276.1	95.1
53	50.1	17.3	113	106.8	36.8	173	163.6	56.3	233	220.3	75.9	293	277.0	95.4
54	51.1	17.6	114	107.8	37.1	174	164.5	56.6	234	221.3	76.2	294	278.0	95.7
55	52.0	17.9	115	108.7	37.4	175	165.5	57.0	235	222.2	76.5	295	278.9	96.0
56	52.9	18.2	116	109.7	37.8	176	166.4	57.3	236	223.1	76.8	296	279.9	96.4
57	53.9	18.6	117	110.6	38.1	177	167.4	57.6	237	224.1	77.2	297	280.8	96.7
58	54.8	18.9	118	111.6	38.4	178	168.3	58.0	238	225.0	77.5	298	281.8	97.0
59	55.8	19.2	119	112.5	38.7	179	169.2	58.3	239	226.0	77.8	299	282.7	97.3
60	56.7	19.5	120	113.5	39.1	180	170.2	58.6	240	226.9	78.1	300	283.7	97.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat	Dist	Dep	Lat

For 71 Degrees.

TABLE II. Difference of Latitude and Departure for 20 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.3	61	57.3	20.9	121	113.7	41.4	181	170.1	61.9	241	226.5	82.4
2	01.9	00.7	62	58.3	21.2	122	114.6	41.7	182	171.0	62.2	242	227.4	82.8
3	02.8	01.0	63	59.2	21.5	123	115.6	42.1	183	172.0	62.6	243	228.3	83.1
4	03.8	01.4	64	60.1	21.9	124	116.5	42.4	184	172.9	62.9	244	229.3	83.5
5	04.7	01.7	65	61.1	22.2	125	117.5	42.8	185	173.8	63.3	245	230.2	83.8
6	05.6	02.1	66	62.0	22.6	126	118.4	43.1	186	174.8	63.6	246	231.2	84.1
7	06.6	02.4	67	63.0	22.9	127	119.3	43.4	187	175.7	64.0	247	232.1	84.5
8	07.5	02.7	68	63.9	23.3	128	120.3	43.8	188	176.7	64.3	248	233.0	84.8
9	08.5	03.1	69	64.8	23.6	129	121.2	44.1	189	177.6	64.6	249	234.0	85.2
10	09.4	03.4	70	65.8	23.9	130	122.2	44.5	190	178.5	65.0	250	234.9	85.5
11	10.3	03.8	71	66.7	24.3	131	123.1	44.8	191	179.5	65.3	251	235.9	85.8
12	11.3	04.1	72	67.7	24.6	132	124.0	45.1	192	180.4	65.7	252	236.8	86.2
13	12.2	04.4	73	68.6	25.0	133	125.0	45.5	193	181.4	66.0	253	237.7	86.5
14	13.2	04.8	74	69.5	25.3	134	125.9	45.8	194	182.3	66.4	254	238.7	86.9
15	14.1	05.1	75	70.5	25.7	135	126.9	46.2	195	183.2	66.7	255	239.6	87.2
16	15.0	05.5	76	71.4	26.0	136	127.8	46.5	196	184.2	67.0	256	240.6	87.6
17	16.0	05.8	77	72.4	26.3	137	128.7	46.9	197	185.1	67.4	257	241.5	87.9
18	16.9	06.2	78	73.3	26.7	138	129.7	47.2	198	186.1	67.7	258	242.4	88.2
19	17.9	06.5	79	74.2	27.0	139	130.6	47.5	199	187.0	68.1	259	243.4	88.6
20	18.8	06.8	80	75.2	27.4	140	131.6	47.9	200	187.9	68.4	260	244.3	88.9
21	19.7	07.2	81	76.1	27.7	141	132.5	48.2	201	188.9	68.7	261	245.3	89.3
22	20.7	07.5	82	77.1	28.0	142	133.4	48.6	202	189.8	69.1	262	246.2	89.6
23	21.6	07.9	83	78.0	28.4	143	134.4	48.9	203	190.8	69.4	263	247.1	90.0
24	22.6	08.2	84	78.9	28.7	144	135.3	49.3	204	191.7	69.8	264	248.1	90.3
25	23.5	08.6	85	79.9	29.1	145	136.3	49.6	205	192.6	70.1	265	249.0	90.6
26	24.4	08.9	86	80.8	29.4	146	137.2	49.9	206	193.6	70.5	266	250.0	91.0
27	25.4	09.2	87	81.8	29.8	147	138.1	50.3	207	194.5	70.8	267	250.9	91.3
28	26.3	09.6	88	82.7	30.1	148	139.1	50.6	208	195.5	71.1	268	251.8	91.7
29	27.3	09.9	89	83.6	30.4	149	140.0	51.0	209	196.4	71.5	269	252.8	92.0
30	28.2	10.3	90	84.6	30.8	150	141.0	51.3	210	197.3	71.8	270	253.7	92.3
31	29.1	10.6	91	85.5	31.1	151	141.9	51.6	211	198.3	72.2	271	254.7	92.7
32	30.1	10.9	92	86.5	31.5	152	142.8	52.0	212	199.2	72.5	272	255.6	93.0
33	31.0	11.3	93	87.4	31.8	153	143.8	52.3	213	200.2	72.9	273	256.5	93.4
34	31.9	11.6	94	88.3	32.1	154	144.7	52.7	214	201.1	73.2	274	257.5	93.7
35	32.9	12.0	95	89.3	32.5	155	145.7	53.0	215	202.0	73.5	275	258.4	94.1
36	33.8	12.3	96	90.2	32.8	156	146.6	53.4	216	203.0	73.9	276	259.4	94.4
37	34.8	12.7	97	91.2	33.2	157	147.5	53.7	217	203.9	74.2	277	260.3	94.7
38	35.7	13.0	98	92.1	33.5	158	148.5	54.0	218	204.9	74.6	278	261.2	95.1
39	36.6	13.3	99	93.0	33.9	159	149.4	54.4	219	205.8	74.9	279	262.2	95.4
40	37.6	13.7	100	94.0	34.2	160	150.4	54.7	220	206.7	75.2	280	263.1	95.8
41	38.5	14.0	101	94.9	34.5	161	151.3	55.1	221	207.7	75.6	281	264.1	96.1
42	39.5	14.4	102	95.8	34.9	162	152.2	55.4	222	208.6	75.9	282	265.0	96.4
43	40.4	14.7	103	96.8	35.2	163	153.2	55.7	223	209.6	76.3	283	265.9	96.8
44	41.3	15.0	104	97.7	35.6	164	154.1	56.1	224	210.5	76.6	284	266.9	97.1
45	42.3	15.4	105	98.7	35.9	165	155.0	56.4	225	211.4	77.0	285	267.8	97.5
46	43.2	15.7	106	99.6	36.3	166	156.0	56.8	226	212.4	77.3	286	268.8	97.8
47	44.2	16.1	107	100.5	36.6	167	156.9	57.1	227	213.3	77.6	287	269.7	98.2
48	45.1	16.4	108	101.5	36,9	168	157.9	57.5	228	214.2	78.0	288	270.6	98.5
49	46.0	16.8	109	102.4	37.3	169	158.8	57.8	229	215.2	78.3	289	271.6	98.8
50	47.0	17.1	110	103.4	37.6	170	159.7	58.1	230	216.1	78.7	290	272.5	99.2
51	47.9	17,4	111	104.3	38.0	171	160.7	58.5	231	217.1	79.0	291	273.5	99.5
52	48.9	17.8	112	105.2	38.3	172	161.6	58.8	232	218.0	79.3	292	274.4	99.9
53	49.8	18.1	113	106.2	38.6	173	162.6	59.2	233	218.9	79.7	293	275.3	100.2
54	50.7	18.5	114	107.1	39.0	174	163.5	59.5	234	219.9	80.0	294	276.3	100.6
55	51.7	18.8	115	108.1	39.3	175	164.4	59.9	235	220.8	80.4	295	277.2	100.9
56	52.6	19.2	116	109.0	39.7	176	165.4	60.2	236	221,8	80.7	296	278.1	101.2
57	53.6	19.5	117	109.9	40.0	177	166.3	60.5	237	222.7	81.1	297	279.1	101.6
58	54.5	19.8	118	110.9	40.4	178	167.3	60.9	238	223.6	81.4	298	280.0	101.9
59	55.4	20.2	119	111.8	40.7	179	168.2	61.2	239	224.6	81.7	299	281.0	102.3
60	56.4	20.5	120	112.8	41.0	180	169.1	61.6	240	225.5	82.1	300	281.9	102.6
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 70 Degrees.

TABLE II. Difference of Latitude and Departure for 21 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	56.9	21.9	121	113.0	43.4	181	169.0	64.9	241	225.0	86.4
2	01.9	00.7	62	57.9	22.2	122	113.9	43.7	182	169.9	65.2	242	225.9	86.7
3	02.8	01.1	63	58.8	22.6	123	114.8	44.1	183	170.8	65.6	243	226.9	87.1
4	03.7	01.4	64	59.7	22.9	124	115.8	44.4	184	171.8	65.9	244	227.8	87.4
5	04.7	01.8	65	60.7	23.3	125	116.7	44.8	185	172.7	66.3	245	228.7	87.8
6	05.6	02.2	66	61.6	23.7	126	117.6	45.2	186	173.6	66.7	246	229.7	88.2
7	06.5	02.5	67	62.5	24.0	127	118.6	45.5	187	174.6	67.0	247	230.6	88.5
8	07.5	02.9	68	63.5	24.4	128	119.5	45.9	188	175.5	67.4	248	231.5	88.9
9	08.4	03.2	69	64.4	24.7	129	120.4	46.2	189	176.4	67.7	249	232.5	89.2
10	09.3	03.6	70	65.4	25.1	130	121.4	46.6	190	177.4	68.1	250	233.4	89.6
11	10.3	03.9	71	66.3	25.4	131	122.3	46.9	191	178.3	68.4	251	234.3	90.0
12	11.2	04.3	72	67.2	25.8	132	123.2	47.3	192	179.2	68.8	252	235.3	90.3
13	12.1	04.7	73	68.2	26.2	133	124.2	47.7	193	180.2	69.2	253	236.2	90.7
14	13.1	05.0	74	69.1	26.5	134	125.1	48.0	194	181.1	69.5	254	237.1	91.0
15	14.0	05.4	75	70.0	26.9	135	126.0	48.4	195	182.0	69.9	255	238.1	91.4
16	14.9	05.7	76	71.0	27.2	136	127.0	48.7	196	183.0	70.2	256	239.0	91.7
17	15.9	06.1	77	71.9	27.6	137	127.9	49.1	197	183.9	70.6	257	239.9	92.1
18	16.8	06.5	78	72.8	28.0	138	128.8	49.5	198	184.8	71.0	258	240.9	92.5
19	17.7	06.8	79	73.8	28.3	139	129.8	49.8	199	185.8	71.3	259	241.8	92.8
20	18.7	07.2	80	74.7	28.7	140	130.7	50.2	200	186.7	71.7	260	242.7	93.2
21	19.6	07.5	81	75.6	29.0	141	131.6	50.5	201	187.6	72.0	261	243.7	93.5
22	20.5	07.9	82	76.6	29.4	142	132.6	50.9	202	188.6	72.4	262	244.6	93.9
23	21.5	08.2	83	77.5	29.7	143	133.5	51.2	203	189.5	72.7	263	245.5	94.3
24	22.4	08.6	84	78.4	30.1	144	134.4	51.6	204	190.5	73.1	264	246.5	94.6
25	23.3	09.0	85	79.4	30.5	145	135.4	52.0	205	191.4	73.5	265	247.4	95.0
26	24.3	09.3	86	80.3	30.8	146	136.3	52.3	206	192.3	73.8	266	248.3	95.3
27	25.2	09.7	87	81.2	31.2	147	137.2	52.7	207	193.3	74.2	267	249.3	95.7
28	26.1	10.0	88	82.2	31.5	148	138.2	53.0	208	194.2	74.5	268	250.2	96.0
29	27.1	10.4	89	83.1	31.9	149	139.1	53.4	209	195.1	74.9	269	251.1	96.4
30	28.0	10.8	90	84.0	32.3	150	140.0	53.8	210	196.1	75.3	270	252.1	96.8
31	28.9	11.1	91	85.0	32.6	151	141.0	54.1	211	197.0	75.6	271	253.0	97.1
32	29.9	11.5	92	85.9	33.0	152	141.9	54.5	212	197.9	76.0	272	253.9	97.5
33	30.8	11.8	93	86.8	33.3	153	142.8	54.8	213	198.9	76.3	273	254.9	97.8
34	31.7	12.2	94	87.8	33.7	154	143.8	55.2	214	199.8	76.7	274	255.8	98.2
35	32.7	12.5	95	88.7	34.0	155	144.7	55.5	215	200.7	77.0	275	256.7	98.6
36	33.6	12.9	96	89.6	34.4	156	145.6	55.9	216	201.7	77.4	276	257.7	98.9
37	34.5	13.3	97	90.6	34.8	157	146.6	56.3	217	202.6	77.8	277	258.6	99.3
38	35.5	13.6	98	91.5	35.1	158	147.5	56.6	218	203.5	78.1	278	259.5	99.6
39	36.4	14.0	99	92.4	35.5	159	148.4	57.0	219	204.5	78.5	279	260.5	100.0
40	37.3	14.3	100	93.4	35.8	160	149.4	57.3	220	205.4	78.8	280	261.4	100.3
41	38.3	14.7	101	94.3	36.2	161	150.3	57.7	221	206.3	79.2	281	262.3	100.7
42	39.2	15.1	102	95.2	36.6	162	151.2	58.1	222	207.3	79.6	282	263.3	101.1
43	40.1	15.4	103	96.2	36.9	163	152.2	58.4	223	208.2	79.9	283	264.2	101.4
44	41.1	15.8	104	97.1	37.3	164	153.1	58.8	224	209.1	80.3	284	265.1	101.8
45	42.0	16.1	105	98.0	37.6	165	154.0	59.1	225	210.1	80.6	285	266.1	102.1
46	42.9	16.5	106	99.0	38.0	166	155.0	59.5	226	211.0	81.0	286	267.0	102.5
47	43.9	16.8	107	99.9	38.3	167	155.9	59.8	227	211.9	81.3	287	267.9	102.9
48	44.8	17.2	108	100.8	38.7	168	156.8	60.2	228	212.9	81.7	288	268.9	103.2
49	45.7	17.6	109	101.8	39.1	169	157.8	60.6	229	213.8	82.1	289	269.8	103.6
50	46.7	17.9	110	102.7	39.4	170	158.7	60.9	230	214.7	82.4	290	270.7	103.9
51	47.6	18.3	111	103.6	39.8	171	159.6	61.3	231	215.7	82.8	291	271.7	104.3
52	48.5	18.6	112	104.6	40.1	172	160.6	61.6	232	216.6	83.1	292	272.6	104.6
53	49.5	19.0	113	105.5	40.5	173	161.5	62.0	233	217.5	83.5	293	273.5	105.0
54	50.4	19.4	114	106.4	40.9	174	162.4	62.4	234	218.5	83.9	294	274.5	105.4
55	51.3	19.7	115	107.4	41.2	175	163.4	62.7	235	219.4	84.2	295	275.4	105.7
56	52.3	20.1	116	108.3	41.6	176	164.3	63.1	236	220.3	84.6	296	276.3	106.1
57	53.2	20.4	117	109.2	41.9	177	165.2	63.4	237	221.3	84.9	297	277.3	106.4
58	54.1	20.8	118	110.2	42.3	178	166.2	63.8	238	222.2	85.3	298	278.2	106.8
59	55.1	21.1	119	111.1	42.6	179	167.1	64.1	239	223.1	85.6	299	279.1	107.2
60	56.0	21.5	120	112.0	43.0	180	168.0	64.5	240	224.1	86.0	300	280.1	107.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 69 Degrees.

TABLE II. Difference of Latitude and Departure for 22 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	56.6	22.9	121	112.2	45.3	181	167.8	67.8	241	223.5	90.3
2	01.9	00.7	62	57.5	23.2	122	113.1	45.7	182	168.7	68.2	242	224.4	90.7
3	02.8	01.1	63	58.4	23.6	123	114.0	46.1	183	169.7	68.6	243	225.3	91.0
4	03.7	01.5	64	59.3	24.0	124	115.0	46.5	184	170.6	68.9	244	226.2	91.4
5	04.6	01.9	65	60.3	24.3	125	115.9	46.8	185	171.5	69.3	245	227.2	91.8
6	05.6	02.2	66	61.2	24.7	126	116.8	47.2	186	172.5	69.7	246	228.1	92.2
7	06.5	02.6	67	62.1	25.1	127	117.8	47.6	187	173.4	70.1	247	229.0	92.5
8	07.4	03.0	68	63.0	25.5	128	118.7	47.9	188	174.3	70.4	248	229.9	92.9
9	08.3	03.4	69	64.0	25.8	129	119.6	48.3	189	175.2	70.8	249	230.9	93.3
10	09.3	03.7	70	64.9	26.2	130	120.5	48.7	190	176.2	71.2	250	231.8	93.7
11	10.2	04.1	71	65.8	26.6	131	121.5	49.1	191	177.1	71.5	251	232.7	94.0
12	11.1	04.5	72	66.8	27·0	132	122.4	49.4	192	178.0	71.9	252	233.7	94.4
13	12.1	04.9	73	67.7	27.3	133	123.3	49.8	193	178.9	72.3	253	234.6	94.8
14	13.0	05.2	74	68.6	27.7	134	124.2	50.2	194	179.9	72.7	254	235.5	95.2
15	13.9	05.6	75	69.5	28.1	135	125.2	50.6	195	180.8	73.0	255	236.4	95.5
16	14.8	06.0	76	70.5	28.5	136	126.1	50.9	196	181.7	73.4	256	237.4	95.9
17	15.8	06.4	77	71.4	28.8	137	127.0	51.3	197	182.7	73.8	257	238.3	96.3
18	16.7	06.7	78	72.3	29.2	138	128.0	51.7	198	183.6	74.2	258	239.2	96.6
19	17.6	07.1	79	73.2	29.6	139	128.9	52.1	199	184.5	74.5	259	240.1	97.0
20	18.5	07.5	80	74.2	30.0	140	129.8	52.4	200	185.4	74.9	260	241.1	97.4
21	19.5	07.9	81	75.1	30.3	141	130.7	52.8	201	186.4	75.3	261	242.0	97.8
22	20.4	08.2	82	76.0	30.7	142	131.7	53.2	202	187.3	75.7	262	242.9	98.1
23	21.3	08.6	83	77.0	31.1	143	132.6	53.6	203	188.2	76.0	263	243.8	98.5
24	22.3	09.0	84	77.9	31.5	144	133.5	53.9	204	189.1	76.4	264	244.8	98.9
25	23.2	09.4	85	78.8	31.8	145	134.4	54.3	205	190.1	76.8	265	245.7	99.3
26	24.1	09.7	86	79.7	32.2	146	135.4	54.7	206	191.0	77.2	266	246.6	99.6
27	25.0	10.1	87	80.7	32.6	147	136.3	55.1	207	191.9	77.5	267	247.6	100.0
28	26.0	10.5	88	81.6	33.0	148	137.2	55.4	208	192.9	77.9	268	248.5	100.4
29	26.9	10.9	89	82.5	33.3	149	138.2	55.8	209	193.8	78.3	269	249.4	100.8
30	27.8	11.2	90	83.4	33.7	150	139.1	56.2	210	194.7	78.7	270	250.3	101.1
31	28.7	11.6	91	84.4	34.1	151	140.0	56.6	211	195.6	79.0	271	251.3	101.5
32	29.7	12.0	92	85.3	34.5	152	140.9	56.9	212	196.6	79.4	272	252.2	101.9
33	30.6	12.4	93	86.2	34.8	153	141.9	57.3	213	197.5	79.8	273	253.1	102.3
34	31.5	12.7	94	87.2	35.2	154	142.8	57.7	214	198.4	80.2	274	254.0	102.6
35	32.5	13.1	95	88.1	35.6	155	143.7	58.1	215	199.3	80.5	275	255.0	103.0
36	33.4	13.5	96	89.0	36.0	156	144.6	58.4	216	200.3	80.9	276	255.9	103.4
37	34.3	13.9	97	89.9	36.3	157	145.6	58.8	217	201.2	81.3	277	256.8	103.8
38	35.2	14.2	98	90.9	36.7	158	146.5	59.2	218	202.1	81.7	278	257.8	104.1
39	36.2	14.6	99	91.8	37.1	159	147.4	59.6	219	203.1	82.0	279	258.7	104.5
40	37.1	15.0	100	92.7	37.5	160	148.3	59.9	220	204.0	82.4	280	259.6	104.9
41	38.0	15.4	101	93.6	37.8	161	149.3	60.3	221	204.9	82.8	281	260.5	105.3
42	38.9	15.7	102	94.6	38.2	162	150.2	60.7	222	205.8	83.2	282	261.5	105.6
43	39.9	16.1	103	95.5	38.6	163	151.1	61.1	223	206.8	83.5	283	262.4	106.0
44	40.8	16.5	104	96.4	39.0	164	152.1	61.4	224	207.7	83.9	284	263.3	106.4
45	41.7	16.9	105	97.4	39.3	165	153.0	61.8	225	208.6	84.3	285	264.2	106.8
46	42.7	17.2	106	98.3	39.7	166	153.9	62.2	226	209.5	84.7	286	265.2	107.1
47	43.6	17.6	107	99.2	40.1	167	154.8	62.6	227	210.5	85.0	287	266.1	107.5
48	44.5	18.0	108	100.1	40.5	168	155.8	62.9	228	211.4	85.4	288	267.0	107.9
49	45.4	18.4	109	101.1	40.8	169	156.7	63.3	229	212.3	85.8	289	268.0	108.3
50	46.4	18.7	110	102.0	41.2	170	157.6	63.7	230	213.3	86.2	290	268.9	108.6
51	47.3	19.1	111	102.9	41.6	171	158.5	64.1	231	214.2	86.5	291	269.8	109.0
52	48.2	19.5	112	103.8	42.0	172	159.5	64.4	232	215.1	86.9	292	270.7	109.4
53	49.1	19.9	113	104.8	42.3	173	160.4	64.8	233	216.0	87.3	293	271.7	109.8
54	50.1	20.2	114	105.7	42.7	174	161.3	65.2	234	217.0	87.7	294	272.6	110.1
55	51.0	20.6	115	106.6	43.1	175	162.3	65.6	235	217.9	88.0	295	273.5	110.5
56	51.9	21.0	116	107.6	43.5	176	163.2	65.9	236	218.8	88.4	296	274.4	110.9
57	52.8	21.4	117	108.5	43.8	177	164.1	66.3	237	219.7	88.8	297	275.4	111.3
58	53.8	21.7	118	109.4	44.2	178	165.0	66.7	238	220.7	89.2	298	276.3	111.6
59	54.7	22.1	119	110.3	44.6	179	166.0	67.1	239	221.6	89.5	299	277.2	112.0
60	55.6	22.5	120	111.3	45.0	180	166.9	67.4	240	222.5	89.9	300	278.2	112.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 68 Degrees.

TABLE II. Difference of Latitude and Departure for 23 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep.
1	00.9	00.4	61	56.2	23.8	121	111.4	47.3	181	166.6	70.7	241	221.8	94.2
2	01.8	00.8	62	57.1	24.2	122	112.3	47.7	182	167.5	71.1	242	222.8	94.6
3	02.8	01.2	63	58.0	24.6	123	113.2	48.1	183	168.5	71.5	243	223.7	94.9
4	03.7	01.6	64	58.9	25.0	124	114.1	48.5	184	169.4	71.9	244	224.6	95.3
5	04.6	02.0	65	59.8	25.4	125	115.1	48.8	185	170.3	72.3	245	225.5	95.7
6	05.5	02.3	66	60.8	25.8	126	116.0	49.2	186	171.2	72.7	246	226.4	96.1
7	06.4	02.7	67	61.7	26.2	127	116.9	49.6	187	172.1	73.1	247	227.4	96.5
8	07.4	03.1	68	62.6	26.6	128	117.8	50.0	188	173.1	73.5	248	228.3	96.9
9	08.3	03.5	69	63.5	27.0	129	118.7	50.4	189	174.0	73.8	249	229.2	97.3
10	09.2	03.9	70	64.4	27.4	130	119.7	50.8	190	174.9	74.2	250	230.1	97.7
11	10.1	04.3	71	65.4	27.7	131	120.6	51.2	191	175.8	74.6	251	231.0	98.1
12	11.0	04.7	72	66.3	28.1	132	121.5	51.6	192	176.7	75.0	252	232.0	98.5
13	12.0	05.1	73	67.2	28.5	133	122.4	52.0	193	177.7	75.4	253	232.9	98.9
14	12.9	05.5	74	68.1	28.9	134	123.3	52.4	194	178.6	75.8	254	233.8	99.2
15	13.8	05.9	75	69.0	29.3	135	124.3	52.7	195	179.5	76.2	255	234.7	99.6
16	14.7	06.3	76	70.0	29.7	136	125.2	53.1	196	180.4	76.6	256	235.6	100.0
17	15.6	06.6	77	70.9	30.1	137	126.1	53.5	197	181.3	77.0	257	236.6	100.4
18	16.6	07.0	78	71.8	30.5	138	127.0	53.9	198	182.3	77.4	258	237.5	100.8
19	17.5	07.4	79	72.7	30.9	139	128.0	54.3	199	183.2	77.8	259	238.4	101.2
20	18.4	07.8	80	73.6	31.3	140	128.9	54.7	200	184.1	78.1	260	239.3	101.6
21	19.3	08.2	81	74.6	31.6	141	129.8	55.1	201	185.0	78.5	261	240.3	102.0
22	20.3	08.6	82	75.5	32.0	142	130.7	55.5	202	185.9	78.9	262	241.2	102.4
23	21.2	09.0	83	76.4	32.4	143	131.6	55.9	203	186.9	79.3	263	242.1	102.8
24	22.1	09.4	84	77.3	32.8	144	132.6	56.3	204	187.8	79.7	264	243.0	103.2
25	23.0	09.8	85	78.2	33.2	145	133.5	56.7	205	188.7	80.1	265	243.9	103.5
26	23.9	10.2	86	79.2	33.6	146	134.4	57.0	206	189.6	80.5	266	244.9	103.9
27	24.9	10.5	87	80.1	34.0	147	135.3	57.4	207	190.5	80.9	267	245.8	104.3
28	25.8	10.9	88	81.0	34.4	148	136.2	57.8	208	191.5	81.3	268	246.7	104.7
29	26.7	11.3	89	81.9	34.8	149	137.2	58.2	209	192.4	81.7	269	247.6	105.1
30	27.6	11.7	90	82.8	35.2	150	138.1	58.6	210	193.3	82.1	270	248.5	105.5
31	28.5	12.1	91	83.8	35.6	151	139.0	59.0	211	194.2	82.4	271	249.5	105.9
32	29.5	12.5	92	84.7	35.9	152	139.9	59.4	212	195.1	82.8	272	250.4	106.3
33	30.4	12.9	93	85.6	36.3	153	140.8	59.8	213	196.1	83.2	273	251.3	106.7
34	31.3	13.3	94	86.5	36.7	154	141.8	60.2	214	197.0	83.6	274	252.2	107.1
35	32.2	13.7	95	87.4	37.1	155	142.7	60.6	215	197.9	84.0	275	253.1	107.5
36	33.1	14.1	96	88.4	37.5	156	143.6	61.0	216	198.8	84.4	276	254.1	107.8
37	34.1	14.5	97	89.3	37.9	157	144.5	61.3	217	199.7	84.8	277	255.0	108.2
38	35.0	14.8	98	90.2	38.3	158	145.4	61.7	218	200.7	85.2	278	255.9	108.6
39	35.9	15.2	99	91.1	38.7	159	146.4	62.1	219	201.6	85.6	279	256.8	109.0
40	36.8	15.6	100	92.1	39.1	160	147.3	62.5	220	202.5	86.0	280	257.7	109.4
41	37.7	16.0	101	93.0	39.5	161	148.2	62.9	221	203.4	86.4	281	258.7	109.8
42	38.7	16.4	102	93.9	39.9	162	149.1	63.3	222	204.4	86.7	282	259.6	110.2
43	39.6	16.8	103	94.8	40.2	163	150.0	63.7	223	205.3	87.1	283	260.5	110.6
44	40.5	17.2	104	95.7	40.6	164	151.0	64.1	224	206.2	87.5	284	261.4	111.0
45	41.4	17.6	105	96·7	41.0	165	151.9	64.5	225	207.1	87.9	285	262.3	111.4
46	42.3	18.0	106	97.6	41.4	166	152.8	64.9	226	208.0	88.3	286	263.3	111.7
47	43.3	18.4	107	98.5	41.8	167	153.7	65.3	227	209.0	88.7	287	264.2	112.1
48	44.2	18.8	108	99.4	42.2	168	154.6	65.6	228	209.9	89.1	288	265.1	112.5
49	45.1	19.1	109	100.3	42.6	169	155.6	66.0	229	210.8	89.5	289	266.0	112.9
50	46.0	19.5	110	101.3	43.0	170	156.5	66.4	230	211.7	89.9	290	266.9	113.3
51	46.9	19.9	111	102.2	43.4	171	157.4	66.8	231	212.6	90.3	291	267.9	113.7
52	47.9	20.3	112	103.1	43.8	172	158.3	67.2	232	213.6	90.6	292	268.8	114.1
53	48.8	20.7	113	104.0	44.2	173	159.2	67.6	233	214.5	91.0	293	269.7	114.5
54	49.7	21.1	114	104.9	44.5	174	160.2	68.0	234	215.4	91.4	294	270.6	114.9
55	50.6	21.5	115	105.9	44.9	175	161.1	68.4	235	216.3	91.8	295	271.5	115.3
56	51.5	21.9	116	106.8	45.3	176	162.0	68.8	236	217.2	92.2	296	272.5	115.7
57	52.5	22.3	117	107.7	45.7	177	162.9	69.2	237	218.2	92.6	297	273.4	116.0
58	53.4	22.7	118	108.6	46.1	178	163.8	69.6	238	219.1	93.0	298	274.3	116.4
59	54.3	23.1	119	109.5	46.5	179	164.8	69.9	239	220.0	93.4	299	275.2	116.8
60	55.2	23.4	120	110.5	46.9	180	165.7	70.3	240	220.9	93.8	300	276.2	117.2
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dis	Dep	Lat.

For 67 Degrees.

TABLE II. Difference of Latitude and Departure for 24 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	55.7	24.8	121	110.5	49.2	181	165.4	73.6	241	220.2	98.0
2	01.8	00.8	62	56.6	25.2	122	111.5	49.6	182	166.3	74.0	242	221.1	98.4
3	02.7	01.2	63	57.6	25.6	123	112.4	50.0	183	167.2	74.4	243	222.0	98.8
4	03.7	01.6	64	58.5	26.0	124	113.3	50.4	184	168.1	74.8	244	222.9	99.2
5	04.6	02.0	65	59.4	26.4	125	114.2	50.8	185	169.0	75.2	245	223.8	99.7
6	05.5	02.4	66	60.3	26.8	126	115.1	51.2	186	169.9	75.7	246	224.7	100.1
7	06.4	02.8	67	61.2	27.3	127	116.0	51.7	187	170.8	76.1	247	225.6	100.5
8	07.3	03.3	68	62.1	27.7	128	116.9	52.1	188	171.7	76.5	248	226.6	100.9
9	08.2	03.7	69	63.0	28.1	129	117.8	52.5	189	172.7	76.9	249	227.5	101.3
10	09.1	04.1	70	63.9	28.5	130	118.8	52.9	190	173.6	77.3	250	228.4	101.7
11	10.0	04.5	71	64.9	28.9	131	119.7	53.3	191	174.5	77.7	251	229.3	102.1
12	11.0	04.9	72	65.8	29.3	132	120.6	53.7	192	175.4	78.1	252	230.2	102.5
13	11.9	05.3	73	66.7	29.7	133	121.5	54.1	193	176.3	78.5	253	231.1	102.9
14	12.8	05.7	74	67.6	30.1	134	122.4	54.5	194	177.2	78.9	254	232.0	103.3
15	13.7	06.1	75	68.5	30.5	135	123.3	54.9	195	178.1	79.3	255	233.9	103.7
16	14.6	06.5	76	69.4	30.9	136	124.2	55.3	196	179.1	79.7	256	233.9	104.1
17	15.5	06.9	77	70.3	31.3	137	125.2	55.7	197	180.0	80.1	257	234.8	104.5
18	16.4	07.3	78	71.3	31.7	138	126.1	56.1	198	180.9	80.5	258	235.7	104.9
19	17.4	07.7	79	72.2	32.1	139	127.0	56.5	199	181.8	80.9	259	236.6	105.3
20	18.3	08.1	80	73.1	32.5	140	127.9	56.9	200	182.7	81.3	260	237.5	105.8
21	19.2	08.5	81	74.0	32.9	141	128.8	57.3	201	183.6	81.8	261	238.4	106.2
22	20.1	08.9	82	74.9	33.4	142	129.7	57.8	202	184.5	82.2	262	239.3	106.6
23	21.0	09.4	83	75.8	33.8	143	130.6	58.2	203	185.4	82.6	263	240.3	107.0
24	21.9	09.8	84	76.7	34.2	144	131.6	58.6	204	186.4	83.0	264	241.2	107.4
25	22.8	10.2	85	77.7	34.6	145	132.5	59.0	205	187.3	83.4	265	242.1	107.8
26	23.8	10.6	86	78.6	35.0	146	133.4	59.4	206	188.2	83.8	266	243.0	108.2
27	24.7	11.0	87	79.5	35.4	147	134.3	59.8	207	189.1	84.2	267	243.9	108.6
28	25.6	11.4	88	80.4	35.8	148	135.2	60.2	208	190.0	84.6	268	244.8	109.0
29	26.5	11.8	89	81.3	36.2	149	136.1	60.6	209	190.9	85.0	269	245.7	109.4
30	27.4	12.2	90	82.2	36.6	150	137.0	61.0	210	191.8	85.4	270	246.7	109.8
31	28.3	12.6	91	83.1	37.0	151	137.9	61.4	211	192.8	85.8	271	247.6	110.2
32	29.2	13.0	92	84.0	37.4	152	138.9	61.8	212	193.7	86.2	272	248.5	110.6
33	30.1	13.4	93	85.0	37.8	153	139.8	62.2	213	194.6	86.6	273	249.4	111.0
34	31.1	13.8	94	85.9	38.2	154	140.7	62.6	214	195.5	87.0	274	250.3	111.4
35	32.0	14.2	95	86.8	38.6	155	141.6	63.0	215	196.4	87.4	275	251.2	111.9
36	32.9	14.6	96	87.7	39.0	156	142.5	63.5	216	197.3	87.9	276	252.1	112.3
37	33.8	15.0	97	88.6	39.5	157	143.4	63.9	217	198.2	88.3	277	253.1	112.7
38	34.7	15.5	98	89.5	39.9	158	144.3	64.3	218	199.2	88.7	278	254.0	113.1
39	35.6	15.9	99	90.4	40.3	159	145.3	64.7	219	200.1	89.1	279	254.9	113.5
40	36.5	16.3	100	91.4	40.7	160	146.2	65.1	220	201.0	89.5	280	255.8	113.9
41	37.5	16.7	101	92.3	41.1	161	147.1	65.5	221	201.9	89.9	281	256.7	114.3
42	38.4	17.1	102	93.2	41.5	162	148.0	65.9	222	202.8	90.3	282	257.6	114.7
43	39.3	17.5	103	94.1	41.9	163	148.9	66.3	223	203.7	90.7	283	258.5	115.1
44	40.2	17.9	104	95.0	42.3	164	149.8	66.7	224	204.6	91.1	284	259.4	115.5
45	41.1	18.3	105	95.9	42.7	165	150.7	67.1	225	205.5	91.5	285	260.4	115.9
46	42.0	18.7	106	96.8	43.1	166	151.6	67.5	226	206.5	91.9	286	261.3	116.3
47	42.9	19.1	107	97.7	43.5	167	152.6	67.9	227	207.4	92.3	287	262.2	116.7
48	43.9	19.5	108	98.7	43.9	168	153.5	68.3	228	208.3	92.7	288	263.1	117.1
49	44.8	19.9	109	99.6	44.3	169	154.4	68.7	229	209.2	93.1	289	264.0	117.5
50	45.7	20.3	110	100.5	44.7	170	155.3	69.1	230	210.1	93.5	290	264.9	118.0
51	46.6	20.7	111	101.4	45.1	171	156.2	69.6	231	211.0	94.0	291	265.8	118.4
52	47.5	21.2	112	102.3	45.6	172	157.1	70.0	232	211.9	94.4	292	266.8	118.8
53	48.4	21.6	113	103.2	46.0	173	158.0	70.4	233	212.9	94.8	293	267.7	119.2
54	49.3	22.0	114	104.1	46.4	174	159.0	70.8	234	213.8	95.2	294	268.6	119.6
55	50.2	22.4	115	105.1	46.8	175	159.9	71.2	235	214.7	95.6	295	269.5	120.0
56	51.2	22.8	116	106.0	47.2	176	160.8	71.6	236	215.6	96.0	296	270.4	120.4
57	52.1	23.2	117	106.9	47.6	177	161.7	72.0	237	216.5	96.4	297	271.3	120.8
58	53.0	23.6	118	107.8	48.0	178	162.6	72.4	238	217.4	96.8	298	272.2	121.2
59	53.9	24.0	119	108.7	48.4	179	163.5	72.8	239	218.3	97.2	299	273.2	121.6
60	54.8	24.4	120	109.6	48.8	180	164.4	73.2	240	219.3	97.6	300	274.1	122.0
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 66 Degrees.

TABLE II. Difference of Latitude and Departure for 25 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	55.3	25.8	121	109.7	51.1	181	164.0	76.5	241	218.4	101.9
2	01.8	00.8	62	56.2	26.2	122	110.6	51.6	182	164.9	76.9	242	219.3	102.3
3	02.7	01.3	63	57.1	26.6	123	111.5	52.0	183	165.9	77.3	243	220.2	102.7
4	03.6	01.7	64	58.0	27.0	124	112.4	52.4	184	166.8	77.8	244	221.1	103.1
5	04.5	02.1	65	58.9	27.5	125	113.3	52.8	185	167.7	78.2	245	222.0	103.5
6	05.4	02.5	66	59.8	27.9	126	114.2	53.2	186	168.6	78.6	246	223.0	104.0
7	06.3	03.0	67	60.7	28.3	127	115.1	53.7	187	169.5	79.0	247	223.9	104.4
8	07.3	03.4	68	61.6	28.7	128	116.0	54.1	188	170.4	79.5	248	224.8	104.8
9	08.2	03.8	69	62.5	29.2	129	116.9	54.5	189	171.3	79.9	249	225.7	105.2
10	09.1	04.2	70	63.4	29.6	130	117.8	54.9	190	172.2	80.3	250	226.6	105.7
11	10.0	04.6	71	64.3	30.0	131	118.7	55.4	191	173.1	80.7	251	227.5	106.1
12	10.9	05.1	72	65.3	30.4	132	119.6	55.8	192	174.0	81.1	252	228.4	106.5
13	11.8	05.5	73	66.2	30.9	133	120.5	56.2	193	174.9	81.6	253	229.3	106.9
14	12.7	05.9	74	67.1	31.3	134	121.4	56.6	194	175.8	82.0	254	230.2	107.3
15	13.6	06.3	75	68.0	31.7	135	122.4	57.1	195	176.7	82.4	255	231.1	107.8
16	14.5	06.8	76	68.9	32.1	136	123.3	57.5	196	177.6	82.8	256	232.0	108.2
17	15.4	07.2	77	69.8	32.5	137	124.2	57.9	197	178.5	83.3	257	232.9	108.6
18	16.3	07.6	78	70.7	33.0	138	125.1	58.3	198	179.4	83.7	258	233.8	109.0
19	17.2	08.0	79	71.6	33.4	139	126.0	58.7	199	180.4	84.1	259	234.7	109.5
20	18.1	08.5	80	72.5	33.8	140	126.9	59.2	200	181.3	84.5	260	235.6	109.9
21	19.0	08.9	81	73.4	34.2	141	127.8	59.6	201	182.2	84.9	261	236.5	110.3
22	19.9	09.3	82	74.3	34.7	142	128.7	60.0	202	183.1	85.4	262	237.5	110.7
23	20.8	09.7	83	75.2	35.1	143	129.6	60.4	203	184.0	85.8	263	238.4	111.1
24	21.8	10.1	84	76.1	35.5	144	130.5	60.9	204	184.9	86.2	264	239.3	111.6
25	22.7	10.6	85	77.0	35.9	145	131.4	61.3	205	185.8	86.6	265	240.2	112.0
26	23.6	11.0	86	77.9	36.3	146	132.3	61.7	206	186.7	87.1	266	241.1	112.4
27	24.5	11.4	87	78.8	36.8	147	133.2	62.1	207	187.6	87.5	267	242.0	112.8
28	25.4	11.8	88	79.8	37.2	148	134.1	62.5	208	188.5	87.9	268	242.9	113.3
29	26.3	12.3	89	80.7	37.6	149	135.0	63.0	209	189.4	88.3	269	243.8	113.7
30	27.2	12.7	90	81.6	38.0	150	135.9	63.4	210	190.3	88.7	270	244.7	114.1
31	28.1	13.1	91	82.5	38.5	151	136.9	63.8	211	191.2	89.2	271	245.6	114.5
32	29.0	13.5	92	83.4	38.9	152	137.8	64.2	212	192.1	89.6	272	246.5	115.0
33	29.9	13.9	93	84.3	39.3	153	138.7	64.7	213	193.0	90.0	273	247.4	115.4
34	30.8	14.4	94	85.2	39.7	154	139.6	65.1	214	193.9	90.4	274	248.3	115.8
35	31.7	14.8	95	86.1	40.1	155	140.5	65.5	215	194.9	90.9	275	249.2	116.2
36	32.6	15.2	96	87.0	40.6	156	141.4	65.9	216	195.8	91.3	276	250.1	116.6
37	33.5	15.6	97	87.9	41.0	157	142.3	66.4	217	196.7	91.7	277	251.0	117.1
38	34.4	16.1	98	88.8	41.4	158	143.2	66.8	218	197.6	92.1	278	252.0	117.5
39	35.3	16.5	99	89.7	41.8	159	144.1	67.2	219	198.5	92.6	279	252.9	117.9
40	36.3	16.9	100	90.6	42.3	160	145.0	67.6	220	199.4	93.0	280	253.8	118.3
41	37.2	17.3	101	91.5	42.7	161	145.9	68.0	221	200.3	93.4	281	254.7	118.8
42	38.1	17.7	102	92.4	43.1	162	146.8	68.5	222	201.2	93.8	282	255.6	119.2
43	39.0	18.2	103	93.3	43.5	163	147.7	68.9	223	202.1	94.2	283	256.5	119.6
44	39.9	18.6	104	94.3	44.0	164	148.6	69.3	224	203.0	94.7	284	257.4	120.0
45	40.8	19.0	105	95.2	44.4	165	149.5	69.7	225	203.9	95.1	285	258.3	120.4
46	41.7	19.4	106	96.1	44.8	166	150.4	70.2	226	204.8	95.5	286	259.2	120.9
47	42.6	19.9	107	97.0	45.2	167	151.4	70.6	227	205.7	95.9	287	260.1	121.3
48	43.5	20.3	108	97.9	45.6	168	152.3	71.0	228	206.6	96.4	288	261.0	121.7
49	44.4	20.7	109	98.8	46.1	169	153.2	71.4	229	207.5	96.8	289	261.9	122.1
50	45.3	21.1	110	99.7	46.5	170	154.1	71.8	230	208.5	97.2	290	262.8	122.6
51	46.2	21.6	111	100.6	46.9	171	155.0	72.3	231	209.4	97.6	291	263.7	123.0
52	47.1	22.0	112	101.5	47.3	172	155.9	72.7	232	210.3	98.0	292	264.6	123.4
53	48.0	22.4	113	102.4	47.8	173	156.8	73.1	233	211.2	98.5	293	265.5	123.8
54	48.9	22.8	114	103.3	48.2	174	157.7	73.5	234	212.1	98.9	294	266.5	124.2
55	49.8	23.2	115	104.2	48.6	175	158.6	74.0	235	213.0	99.3	295	267.4	124.7
56	50.8	23.7	116	105.1	49.0	176	159.5	74.4	236	213.9	99.7	296	268.3	125.1
57	51.7	24.1	117	106.0	49.4	177	160.4	74.8	237	214.8	100.2	297	269.2	125.5
58	52.6	24.5	118	106.9	49.9	178	161.3	75.2	238	215.7	100.6	298	270.1	125.9
59	53.5	24.9	119	107.9	50.3	179	162.2	75.6	239	216.6	101.0	299	271.0	126.4
60	54.4	25.4	120	108.8	50.7	180	163.1	76.1	240	217.5	101.4	300	271.9	126.8
Dist	Dep	Lat.	Dis.	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

F

For 65 Degrees.

TABLE II. Difference of Latitude and Departure for 26 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.4	61	54.8	26.7	121	108.8	53.0	181	162.7	79.3	241	216.6	105.6
2	01.8	00.9	62	55.7	27.2	122	109.7	53.5	182	163.6	79.8	242	217.5	106.1
3	02.7	01.3	63	56.6	27.6	123	110.6	53.9	183	164.5	80.2	243	218.4	106.5
4	03.6	01.8	64	57.5	28.1	124	111.5	54.4	184	165.4	80.7	244	219.3	107.0
5	04.5	02.2	65	58.4	28.5	125	112.3	54.8	185	166.3	81.1	245	220.2	107.4
6	05.4	02.6	66	59.3	28.9	126	113.2	55.2	186	167.2	81.5	246	221.1	107.8
7	06.3	03.1	67	60.2	29.4	127	114.1	55.7	187	168.1	82.0	247	222.0	108.3
8	07.2	03.5	68	61.1	29.8	128	115.0	56.1	188	169.0	82.4	248	222.9	108.7
9	08.1	03.9	69	62.0	30.2	129	115.9	56.5	189	169.9	82.9	249	223.8	109.2
10	09.0	04.4	70	62.9	30.7	130	116.8	57.0	190	170.8	83.3	250	224.7	109.6
11	09.9	04.8	71	63.8	31.1	131	117.7	57.4	191	171.7	83.7	251	225.6	110.0
12	10.8	05.3	72	64.7	31.6	132	118.6	57.9	192	172.6	84.2	252	226.5	110.5
13	11.7	05.7	73	65.6	32.0	133	119.5	58.3	193	173.5	84.6	253	227.4	110.9
14	12.6	06.1	74	66.5	32.4	134	120.4	58.7	194	174.4	85.0	254	228.3	111.3
15	13.5	06.6	75	67.4	32.9	135	121.3	59.2	195	175.3	85.5	255	229.2	111.8
16	14.4	07.0	76	68.3	33.3	136	122.2	59.6	196	176.2	85.9	256	230.1	112.2
17	15.3	07.5	77	69.2	33.8	137	123.1	60.1	197	177.1	86.4	257	231.0	112.7
18	16.2	07.9	78	70.1	34.2	138	124.0	60.5	198	178.0	86.8	258	231.9	113.1
19	17.1	08.3	79	71.0	34.6	139	124.9	60.9	199	178.9	87.2	259	232.8	113.5
20	18.0	08.8	80	71.9	35.1	140	125.8	61.4	200	179.8	87.7	260	233.7	114.0
21	18.9	09.2	81	72.8	35.5	141	126.7	61.8	201	180.7	88.1	261	234.6	114.4
22	19.8	09.6	82	73.7	35.9	142	127.6	62.2	202	181.6	88.6	262	235.5	114.9
23	20.7	10.1	83	74.6	36.4	143	128.5	62.7	203	182.5	89.0	263	236.4	115.3
24	21.6	10.5	84	75.5	36.8	144	129.4	63.1	204	183.4	89.4	264	237.3	115.7
25	22.5	11.0	85	76.4	37.3	145	130.3	63.6	205	184.3	89.9	265	238.2	116.2
26	23.4	11.4	86	77.3	37.7	146	131.2	64.0	206	185.2	90.3	266	239.1	116.6
27	24.3	11.8	87	78.2	38.1	147	132.1	64.4	207	186.1	90.7	267	240.0	117.0
28	25.2	12.3	88	79.1	38.6	148	133.0	64.9	208	186.9	91.2	268	240.9	117.5
29	26.1	12.7	89	80.0	39.0	149	133.9	65.3	209	187.8	91.6	269	241.8	117.9
30	27.0	13.2	90	80.9	39.5	150	134.8	65.8	210	188.7	92.1	270	242.7	118.4
31	27.9	13.6	91	81.8	39.9	151	135.7	66.2	211	189.6	92.5	271	243.6	118.8
32	28.8	14.0	92	82.7	40.3	152	136.6	66.6	212	190.5	92.9	272	244.5	119.2
33	29.7	14.5	93	83.6	40.8	153	137.5	67.1	213	191.4	93.4	273	245.4	119.7
34	30.6	14.9	94	84.5	41.2	154	138.4	67.5	214	192.3	93.8	274	246.3	120.1
35	31.5	15.3	95	85.4	41.6	155	139.3	67.9	215	193.2	94.2	275	247.2	120.6
36	32.4	15.8	96	86.3	42.1	156	140.2	68.4	216	194.1	94.7	276	248.1	121.0
37	33.3	16.2	97	87.2	42.5	157	141.1	68.8	217	195.0	95.1	277	249.0	121.4
38	34.2	16.7	98	88.1	43.0	158	142.0	69.3	218	195.9	95.6	278	249.9	121.9
39	35.1	17.1	99	89.0	43.4	159	142.9	69.7	219	196.8	96.0	279	250.8	122.3
40	36.0	17.5	100	89.9	43.8	160	143.8	70.1	220	197.7	96.4	280	251.7	122.7
41	36.9	18.0	101	90.8	44.3	161	144.7	70.6	221	198.6	96.9	281	252.6	123.2
42	37.7	18.4	102	91.7	44.7	162	145.6	71.0	222	199.5	97.3	282	253.5	123.6
43	38.6	18.8	103	92.6	45.2	163	146.5	71.5	223	200.4	97.8	283	254.4	124.1
44	39.5	19.3	104	93.5	45.6	164	147.4	71.9	224	201.3	98.2	284	255.3	124.5
45	40.4	19.7	105	94.4	46.0	165	148.3	72.3	225	202.2	98.6	285	256.2	124.9
46	41.3	20.2	106	95.3	46.5	166	149.2	72.8	226	203.1	99.1	286	257.1	125.4
47	42.2	20.6	107	96.2	46.9	167	150.1	73.2	227	204.0	99.5	287	258.0	125.8
48	43.1	21.0	108	97.1	47.3	168	151.0	73.6	228	204.9	99.9	288	258.9	126.3
49	44.0	21.5	109	98.0	47.8	169	151.9	74.1	229	205.8	100.4	289	259.8	126.7
50	44.9	21.9	110	98.9	48.2	170	152.8	74.5	230	206.7	100.8	290	260.7	127.1
51	45.8	22.4	111	99.8	48.7	171	153.7	75.0	231	207.6	101.3	291	261.5	127.6
52	46.7	22.8	112	100.7	49.1	172	154.6	75.4	232	208.5	101.7	292	262.4	128.0
53	47.6	23.2	113	101.6	49.5	173	155.5	75.8	233	209.4	102.1	293	263.3	128.4
54	48.5	23.7	114	102.5	50.0	174	156.4	76.3	234	210.3	102.6	294	264.2	128.9
55	49.4	24.1	115	103.4	50.4	175	157.3	76.7	235	211.2	103.0	295	265.1	129.3
56	50.3	24.5	116	104.3	50.9	176	158.2	77.2	236	212.1	103.5	296	266.0	129.8
57	51.2	25.0	117	105.2	51.3	177	159.1	77.6	237	213.0	103.9	297	266.9	130.2
58	52.1	25.4	118	106.1	51.7	178	160.0	78.0	238	213.9	104.3	298	267.8	130.6
59	53.0	25.9	119	107.0	52.2	179	160.9	78.5	239	214.8	104.8	299	268.7	131.1
60	53.9	26.3	120	107.9	52.6	180	161.8	78.9	240	215.7	105.2	300	269.6	131.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 64 Degrees.

TABLE II. Difference of Latitude and Departure for 27 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat	Dep
1	00.9	00.5	61	54.4	27.7	121	107.8	54.9	181	161·3	82.2	241	214.7	109.4
2	01.8	00.9	62	55.2	28.1	122	108.7	55.4	182	162.2	82.6	242	215.6	109.9
3	02.7	01.4	63	56.1	28.6	123	109.6	55.8	183	163.1	83.1	243	216.5	110.3
4	03.6	01.8	64	57.0	29.1	124	110.5	56.3	184	163.9	83.5	244	217.4	110.8
5	04.5	02.3	65	57.9	29.5	125	111.4	56.7	185	164.8	84.0	245	218.3	111.2
6	05.3	02.7	66	58.8	30.0	126	112.3	57.2	186	165.7	84.4	246	219.2	111.7
7	06.2	03.2	67	59.7	30.4	127	113.2	57.7	187	166.6	84.9	247	220.1	112.1
8	07.1	03.6	68	60.6	30.9	128	114.0	58.1	188	167.5	85.4	248	221.0	112.6
9	08.0	04.1	69	61.5	31.3	129	114.9	58.6	189	168.4	85.8	249	221.9	113.0
10	08.9	04.5	70	62.4	31.8	130	115.8	59.0	190	169.3	86.3	250	222.8	113.5
11	09.8	05.0	71	63.3	32.2	131	116.7	59.5	191	170.2	86.7	251	223.6	114.0
12	10.7	05.4	72	64.2	32.7	132	117.6	59.9	192	171.1	87.2	252	224.5	114.4
13	11.6	05.9	73	65.0	33.1	133	118.5	60.4	193	172.0	87.6	253	225.4	114.9
14	12.5	06.4	74	65.9	33.6	134	119.4	60.8	194	172.9	88.1	254	226.3	115.3
15	13.4	06.8	75	66.8	34.0	135	120.3	61.3	195	173.7	88.5	255	227.2	115·8
16	14.3	07.3	76	67.7	34.5	136	121.2	61.7	196	174.6	89.0	356	228.1	116.2
17	15.1	07.7	77	68.6	35.0	137	122.1	62.2	197	175.5	89.4	257	229.0	116.7
18	16.0	08.2	78	69.5	35.4	138	123.0	62.7	198	176.4	89.9	258	229.9	117.1
19	16.9	08.6	79	70.4	35.9	139	123.8	63.1	199	177.3	90.3	259	230.8	117.6
20	17.8	09.1	80	71.3	36.3	140	124.7	63.6	200	178.2	90.8	260	231.7	118.0
21	18.7	09.5	81	72.2	36.8	141	125.6	64.0	201	179.1	91.3	261	232.6	118.5
22	19.6	10.0	82	73.1	37.2	142	126.5	64.5	202	180.0	91.7	262	233.4	118.9
23	20.5	10.4	83	74.0	37.7	143	127.4	64.9	203	180.9	92.2	263	234.3	119.4
24	21.4	10.9	84	74.8	38.1	144	128.3	65.4	204	181.8	92.6	264	235.2	119.9
25	22.3	11.3	85	75.7	38.6	145	129.2	65.8	205	182.7	93.1	265	236.1	120.3
26	23.2	11.8	86	76.6	39.0	146	130.1	66.3	206	183.5	93.5	266	237.0	120.8
27	24.1	12.3	87	77.5	39.5	147	131.0	66.7	207	184.4	94.0	267	237.9	121.2
28	24.9	12.7	88	78.4	40.0	148	131.9	67.2	208	185.3	94.4	268	238.8	121.7
29	25.8	13.2	89	79.3	40.4	149	132.8	67.6	209	186.2	94.9	269	239.7	122.1
30	26.7	13.6	90	80.2	40.9	150	133.7	68.1	210	187.1	95.3	270	240.6	122.6
31	27.6	14.1	91	81.1	41.3	151	134.5	68.6	211	188.0	95.8	271	241.5	123.0
32	28.5	14.5	92	82.0	41.8	152	135.4	69.0	212	188.9	96.2	272	242.4	123.5
33	29.4	15.0	93	82.9	42.2	153	136.3	69.5	213	189.8	96.7	273	243.2	123.9
34	30.3	15.4	94	83.8	42.7	154	137.2	69.9	214	190.7	97.2	274	244.1	124.4
35	31.2	15.9	95	84.6	43.1	155	138.1	70.4	215	191.6	97.6	275	245.0	124.8
36	32.1	16.3	96	85.5	43.6	156	139.0	70.8	216	192.5	98.1	276	245.9	125.3
37	33.0	16.8	97	86.4	44.0	157	139.9	71.3	217	193.3	98.5	277	246.8	125.8
38	33.9	17.3	98	87.3	44.5	158	140.8	71.7	218	194.2	99.0	278	247.7	126.2
39	34.7	17.7	99	88.2	44.9	159	141.7	72.2	219	195.1	99.4	279	248.6	126.7
40	35.6	18.2	100	89.1	45.4	160	142.6	72.6	220	196.0	99.9	280	249.5	127.1
41	36.5	18.6	101	90.0	45.9	161	143.5	73.1	221	196.9	100.3	281	250.4	127.6
42	37.4	19.1	102	90.9	46.3	162	144.3	73.5	222	197.8	100.8	282	251.3	128.0
43	38.3	19.5	103	91.8	46.8	163	145.2	74.0	223	198.7	101.2	283	252.2	128.5
44	39.2	20.0	104	92.7	47.2	164	146.1	74.5	224	199.6	101.7	284	253.0	128.9
45	40.1	20.4	105	93.6	47.7	165	147.0	74.9	225	200.5	102.1	285	253.9	129.4
46	41.0	20.9	106	94.4	48.1	166	147.9	75.4	226	201.4	102.6	286	254.8	129.8
47	41.9	21.3	107	95.3	48.6	167	148.8	75.8	227	202.3	103.1	287	255.7	130.3
48	42.8	21.8	108	96.2	49.0	168	149.7	76.3	228	203.1	103.5	288	256.6	130.7
49	43.7	22.2	109	97.1	49.5	169	150.6	76.7	229	204.0	104.0	289	257.5	131.2
50	44.6	22.7	110	98.0	49.9	170	151.5	77.2	230	204.9	104.4	290	258.4	131.7
51	45.4	23.2	111	98.9	50.4	171	152.4	77.6	231	205.8	104.9	291	259.3	132.1
52	46.3	23.6	112	99.8	50.8	172	153.3	78.1	232	206.7	105.3	292	260.2	132.6
53	47.2	24.1	113	100.7	51.3	173	154.1	78.5	233	207.6	105.8	293	261.1	133.0
54	48.1	24.5	114	101.6	51.8	174	155.0	79.0	234	208.5	106.2	294	262.0	133.5
55	49.0	25.4	115	102.5	52.2	175	155.9	79.4	235	209.4	106.7	295	262.8	133.9
56	49.9	25.0	116	103.4	52.7	176	156.8	79.9	236	210.3	107.1	296	263.7	134.4
57	50.8	25.9	117	104.2	53.1	177	157.7	80.4	237	211.2	107.6	297	264.6	134.8
58	51.7	26.3	118	105.1	53.6	178	158.6	80.8	238	212.1	108.0	298	265.5	135.3
59	52.6	26.8	119	106.0	54.0	179	159.5	81.3	239	213.0	108.5	299	266.4	135.7
60	53.5	27.2	120	106.9	54.5	180	160.4	81.7	240	213.8	109.0	300	267.3	136.2
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 63 Degrees.

TABLE II. Difference of Latitude and Departure for 28 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	53.9	28.6	121	106.8	56.8	181	159.8	85.0	241	212.8	113.1
2	01.8	00.9	62	54.7	29.1	122	107.7	57.3	182	160.7	85.4	242	213.7	113.6
3	02.6	01.4	63	55.6	29.6	123	108.6	57.7	183	161.6	85.9	243	214.6	114.1
4	03.5	01.9	64	56.5	30.0	124	109.5	58.2	184	162.5	86.4	244	215.4	114.6
5	04.4	02.3	65	57.4	30.5	125	110.4	58.7	185	163.3	86.9	245	216.3	115.0
6	05.3	02.8	66	58.3	31.0	126	111.3	59.2	186	164.2	87.3	246	217.2	115.5
7	06.2	03.3	67	59.2	31.5	127	112.1	59.6	187	165.1	87.8	247	218.1	116.0
8	07.1	03.8	68	60.0	31.9	128	113.0	60.1	188	166.0	88.3	248	219.0	116.4
9	07.9	04.2	69	60.9	32.4	129	113.9	60.6	189	166.9	88.7	249	219.9	116.9
10	08.8	04.7	70	61.8	32.9	130	114.8	61.0	190	167.8	89.2	250	220.7	117.4
11	09.7	05.2	71	62.7	33.3	131	115.7	61.5	191	168.6	89.7	251	221.6	117.8
12	10.6	05.6	72	63.6	33.8	132	116.5	2.0	192	169.5	90.1	252	222.5	118.3
13	11.5	06.1	73	64.5	34.3	133	117.4	62.4	193	170.4	90.6	253	223.4	118.8
14	12.4	06.6	74	65.3	34.7	134	118.3	62.9	194	171.3	91.1	254	224.3	119.2
15	13.2	07.0	75	66.2	35.2	135	119.2	63.4	195	172.2	91.5	255	225.2	119.7
16	14.1	07.5	76	67.1	35.7	136	120.1	63.8	196	173.1	92.0	256	226.0	120.2
17	15.0	08.0	77	68.0	36.1	137	121.0	64.3	197	173.9	92.5	257	226.9	120.7
18	15.9	08.5	78	68.9	36.6	138	121.8	64.8	198	174.8	93.0	258	227.8	121.1
19	16.8	08.9	79	69.8	37.1	139	122.7	65.3	199	175.7	93.4	259	228.7	121.6
20	17.7	09.4	80	70.6	37.6	140	123.6	65.7	200	176.6	93.9	260	229.6	122.1
21	18.5	09.9	81	71.5	38.0	141	124.5	66.2	201	177.5	94.4	261	230.4	122.5
22	19.4	10.3	82	72.4	38.5	142	125.4	66.7	202	178.4	94.8	262	231.3	123.0
23	20.3	10.8	83	73.3	39.0	143	126.3	67.1	203	179.2	95.3	263	232.2	123.5
24	21.2	11.3	84	74.2	39.4	144	127.1	67.6	204	180.1	95.8	264	233.1	123.9
25	22.1	11.7	85	75.1	39.9	145	128.0	68.1	205	181.0	96.2	265	234.0	124.4
26	23.0	12.2	86	75.9	40.4	146	128.9	68.5	206	181.9	96.7	266	234.9	124.9
27	23.8	12.7	87	76.8	40.8	147	129.8	69.0	207	182.8	97.2	267	235.7	125.3
28	24.7	13.1	88	77.7	41.3	148	130.7	69.5	208	183.7	97.7	268	236.6	125.8
29	25.6	13.6	89	78.6	41.8	149	131.6	70.0	209	184.5	98.1	269	237.5	126.3
30	26.5	14.1	90	79.5	42.3	150	132.4	70.4	210	185.4	98.6	270	238.4	126.8
31	27.4	14.6	91	80.3	42.7	151	133.3	70.9	211	186.3	99.1	271	239.3	127.2
32	28.3	15.0	92	81.2	43.2	152	134.2	71.4	212	187.2	99.5	272	240.2	127.7
33	29.1	15.5	93	82.1	43.7	153	135.1	71.8	213	188.1	100.0	273	241.0	128.2
34	30.0	16.0	94	83.0	44.1	154	136.0	72.3	214	189.0	100.5	274	241.9	128.6
35	30.9	16.4	95	83.9	44.6	155	136.9	72.8	215	189.8	100.9	275	242.8	129.1
36	31.8	16.9	96	84.8	45.1	156	137.7	73.2	216	190.7	101.4	276	243.7	129.6
37	32.7	17.4	97	85.6	45.5	157	138.6	73.7	217	191.6	101.9	277	244.6	130.0
38	33.6	17.8	98	86.5	46.0	158	139.5	74.2	218	192.5	102.3	278	245.5	130.5
39	34.4	18.3	99	87.4	46.5	159	140.4	74.6	219	193.4	102.8	279	246.3	131.0
40	35.3	18.8	100	88.3	46.9	160	141.3	75.1	220	194.2	103.3	280	247.2	131.5
41	36.2	19.2	101	89.2	47.4	161	142.2	75.6	221	195.1	103.8	231	248.1	131.9
42	37.1	19.7	102	90.1	47.9	162	143.0	76.1	222	196.0	104.2	282	249.0	132.4
43	38.0	20.2	103	90.9	48.4	163	143.9	76.5	223	196.9	104.7	283	249.9	132.9
44	38.8	20.7	104	91.8	48.8	164	144.8	77.0	224	197.8	105.2	284	250.8	133.3
45	39.7	21.1	105	92.7	49.3	165	145.7	77.5	225	198.7	105.6	285	251.6	133.8
46	40.6	21.6	106	93.6	49.8	166	146.6	77.9	226	199.5	106.1	286	252.5	134.3
47	41.5	22.1	107	94.5	50.2	167	147.5	78.4	227	200.4	106.6	287	253.4	134.7
48	42.4	22.5	108	95.4	50.7	168	148.3	78.9	228	201.3	107.0	288	254.3	135.2
49	43.3	23.0	109	96.2	51.2	169	149.2	79.3	229	202.2	107.5	289	255.2	135.7
50	44.1	23.5	110	97.1	51.6	170	150.1	79.8	230	203.1	108.0	290	256.1	136.1
51	45.0	23.9	111	98.0	52.1	171	151.0	80.3	231	204.0	108.4	291	256.9	136.6
52	45.9	24.4	112	98.9	52.6	172	151.9	80.7	232	204.8	108.9	292	257.8	137.1
53	46.8	24.9	113	99.8	53.1	173	152.7	81.2	233	205.7	109.4	293	258.7	137.6
54	47.7	25.4	114	100.7	53.5	174	153.6	81.7	234	206.6	109.9	294	259.6	138.0
55	48.6	25.8	115	101.5	54.0	175	154.5	82.2	235	207.5	110.3	295	260.5	138.5
56	49.4	26.3	116	102.4	54.5	176	155.4	82.6	236	208.4	110.8	296	261.3	139.0
57	50.3	26.8	117	103.3	54.9	177	156.3	83.1	237	209.3	111.3	297	262.2	139.4
58	51.2	27.2	118	104.2	55.4	178	157.2	83.6	238	210.1	111.7	298	263.1	139.9
59	52.1	27.7	119	105.1	55.9	179	158.0	84.0	239	211.0	112.2	299	264.0	140.4
60	53.0	28.2	120	106.9	56.3	180	158.9	84.5	240	211.9	112.7	300	264.9	140.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 62 Degrees.

TABLE II. Difference of Latitude and Departure for 29 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	53.4	29.6	121	105.8	58.7	181	158.3	87.8	241	210.8	116.8
2	01.7	01.0	62	54.2	30.1	122	106.7	59.1	182	159.2	88.2	242	211.7	117.3
3	02.6	01.5	63	55.1	30.5	123	107.6	59.6	183	160.1	88.7	243	212.5	117.8
4	03.5	01.9	64	56.0	31.0	124	108.5	60.1	184	160.9	89.2	244	213.4	118.3
5	04.4	02.4	65	56.9	31.5	125	109.3	60.6	185	161.8	89.7	245	214.3	118.8
6	05.2	02.9	66	57.7	32.0	126	110.2	61.1	186	162.7	90.2	246	215.2	119.3
7	06.1	03.4	67	58.6	32.5	127	111.1	61.6	187	163.6	90.7	247	216.0	119.7
8	07.0	03.9	68	59.5	33.0	128	112.0	62.1	188	164.4	91.1	248	216.9	120.2
9	07.9	04.4	69	60.3	33.5	129	112.8	62.5	189	165.3	91.6	249	217.8	120.7
10	08.7	04.8	70	61.2	33.9	130	113.7	63.0	190	166.2	92.1	250	218.7	121.2
11	09.6	05.3	71	62.1	34.4	131	114.6	63.5	191	167.1	92.6	251	219.5	121.7
12	10.5	05.8	72	63.0	34.9	132	115.4	64.0	192	167.9	93.1	252	220.4	122.2
13	11.4	06.3	73	63.8	35.4	133	116.3	64.5	193	168.8	93.6	253	221.3	122.7
14	12.2	06.8	74	64.7	35.9	134	117.2	65.0	194	169.7	94.1	254	222.2	123.1
15	13.1	07.3	75	65.6	36.4	135	118.1	65.4	195	170.6	94.5	255	223.0	123.6
16	14.0	07.8	76	66.5	36.8	136	118.9	65.9	196	171.4	95.0	256	223.9	124.1
17	14.9	08.2	77	67.3	37.3	137	119.8	66.4	197	172.3	95.5	257	224.8	124.6
18	15.7	08.7	78	68.2	37.8	138	120.7	66.9	198	173.2	96.0	258	225.7	125.1
19	16.6	09.2	79	69.1	38.3	139	121.6	67.4	199	174.0	96.5	259	226.5	125.6
20	17.5	09.7	80	70.0	38.8	140	122.4	67.9	200	174.9	97.0	260	227.4	126.1
21	18.4	10.3	81	70.8	39.3	141	123.3	68.4	201	175.8	97.4	261	228.2	126.5
22	19.2	10.7	82	71.7	39.8	142	124.2	68.8	202	176.7	97.9	262	229.3	127.0
23	20.1	11.2	83	72.6	40.2	143	125.1	69.3	203	177.5	98.4	263	230.0	127.5
24	21.0	11.6	84	73.5	40.7	144	125.9	69.8	204	178.4	98.9	264	230.9	128.0
25	21.9	12.1	85	74.3	41.2	145	126.8	70.3	205	179.3	99.4	265	231.8	128.5
26	22.7	12.6	86	75.2	41.7	146	127.7	70.8	206	180.2	99.9	266	232.6	129.0
27	23.6	13.1	87	76.1	42.2	147	128.6	71.3	207	181.0	100.4	267	233.5	129.4
28	24.5	13.6	88	77.0	42.7	148	129.4	71.8	208	181.9	100.8	268	234.4	129.9
29	25.4	14.1	89	77.8	43.1	149	130.3	72.2	209	182.8	101.3	269	235.3	130.4
30	26 2	14.5	90	78.7	43.6	150	131.2	72.7	210	183.7	101.8	270	236.1	130.9
31	27.1	15.0	91	79.6	44.1	151	132.1	73.2	211	184.5	102.3	271	237.0	131.4
32	28.0	15.5	92	80.5	44.6	152	132.9	73.7	212	185.4	102.8	272	237.9	131.9
33	28.9	16.0	93	81.3	45.1	153	133.8	74.2	213	186.3	103.3	273	238.8	132.4
34	29.7	16.5	94	82.2	45.6	154	134.7	74.7	214	187.2	103.7	274	239.6	132.8
35	30.6	17.0	95	83.1	46.1	155	135.6	75.1	215	188.0	104.2	275	240.5	133.3
36	31.5	17.5	96	84.0	46.5	156	136.4	75.6	216	188.9	104.7	276	241.4	133.8
37	32.4	17.9	97	84.8	47.0	157	137.3	76.1	217	189.8	105.2	277	242.3	134.3
38	33.2	18.4	98	85.7	47.5	158	138.2	76.6	218	190.7	105.7	278	243.1	134.8
39	34.1	18.9	99	86.6	48.0	159	139.1	77.1	219	191.5	106.2	279	244.0	135.3
40	35.0	19.4	100	87.5	48.5	160	139.9	77.6	220	192.4	106.7	280	244.9	135.7
41	25.9	19.9	101	88.3	49.0	161	140.8	78.1	221	193.3	107.1	281	245.8	136.2
42	36.7	20.4	102	89.2	49.5	162	141.7	78.5	222	194.2	107.6	282	246.6	136.7
43	37.6	20.8	103	90.1	49.9	163	142.6	79.0	223	195.0	108.1	283	247.5	137.2
44	38.5	21.3	104	91.0	50.4	164	143.4	79.5	224	195.9	108.6	284	248.4	137.7
45	39.4	21.8	105	91.8	50.9	165	144.3	80.0	225	196.8	109.1	285	249.3	138.2
46	40.2	22.3	106	92.7	51.4	166	145.2	80.5	226	197.7	109.6	286	250.1	138.7
47	41.1	22.8	107	93.6	51.9	167	146.1	81.0	227	198.5	110.1	287	251.0	139.1
48	42.0	23.3	108	94.5	52.4	168	146.9	81.4	228	199.4	110.5	288	251.9	139.6
49	42.9	23.8	109	95.3	52.8	169	147.8	81.9	229	200.3	111.0	289	252.8	140.1
50	43.7	24.2	110	96.2	53.3	170	148.7	82.4	230	201.2	111.5	290	253.6	140.6
51	44.6	24.7	111	97.1	53.8	171	149.6	82.9	231	202.0	112.0	291	254.5	141.1
52	45.5	25.2	112	98.0	54.3	172	150.4	83.4	232	202.9	112.5	292	255.4	141.6
53	46.4	25.7	113	98.8	54.8	173	151.3	83.9	233	203.8	113.0	293	256.3	142.0
54	47.2	26.2	114	99.7	55.3	174	152.2	84.4	234	204.7	113.4	294	257.1	142.5
55	48.1	26.7	115	100.6	55.8	175	153.1	84.8	235	205.5	113.9	295	258.0	143.0
56	49.0	27.1	116	101.5	56.2	176	153.9	85.3	236	206.4	114.4	296	258.9	143.5
57	49.9	27.6	117	102.3	56.7	177	154.8	85.8	237	207.3	114.9	297	259.8	144.0
58	50.7	23.1	118	103.2	57.2	178	155.7	86.3	238	208.2	115.4	298	260.6	144.5
59	51.6	28.6	119	104.1	57.7	179	156.6	86.8	239	209.0	115.9	299	261.5	145.0
60	52.5	29.1	120	105.0	58.2	180	157.4	87.3	240	209.9	116.4	300	262.4	145.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 61 Degrees.

TABLE II. Difference of Latitude and Departure for 30 Degrees,

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	52.8	30.5	121	104.8	60.5	181	156.8	90.5	241	208.7	120.5
2	01.7	01.0	62	53.7	31.0	122	105.7	61.0	182	157.6	91.0	242	209.6	121.0
3	02.6	01.5	63	54.6	31.5	123	106.5	61.5	183	158.5	91.5	243	210.4	121.5
4	03.5	02.0	64	55.4	32.0	124	107.4	62.0	184	159.3	92.0	244	211.3	122.0
5	04.3	02.5	65	56.3	32.5	125	108.3	62.5	185	160.2	92.5	245	212.2	122.5
6	05.2	03.0	66	57.2	33.0	126	109.1	63.0	186	161.1	93.0	246	213.0	123.0
7	06.1	03.5	67	58.0	33.5	127	110.0	63.5	187	161.9	93.5	247	213.9	123.5
8	06.9	04.0	68	58.9	34.0	128	110.9	64.0	188	162.8	94.0	248	214.8	124.0
9	07.8	04.5	69	59.8	34.5	129	111.7	64.5	189	163.7	94.5	249	215.6	124.5
10	08.7	05.0	70	60.6	35.0	130	112.6	65.0	190	164.5	95.0	250	216.5	125.0
11	09.5	05.5	71	61.5	35.5	131	113.4	65.5	191	165.4	95.5	251	217.4	125.5
12	10.4	06.0	72	62.4	36.0	132	114.3	66.0	192	166.3	96.0	252	218.2	126.0
13	11.3	06.5	73	63.2	36.5	133	115.2	66.5	193	167.1	96.5	253	219.1	126.5
14	12.1	07.0	74	64.1	37.0	134	116.0	67.0	194	168.0	97.0	254	220.0	127.0
15	13.0	07.5	75	65.0	37.5	135	116.9	67.5	195	168.9	97.5	255	220.8	127.5
16	13.9	08.0	76	65.8	38.0	136	117.8	68.0	196	169.7	98.0	256	221.7	128.0
17	14.7	08.5	77	66.7	38.5	137	118.6	68.5	197	170.6	98.5	257	222.6	128.5
18	15.6	09.0	78	67.5	39.0	138	119.5	69.0	198	171.5	99.0	258	223.4	129.0
19	16.5	09.5	79	68.4	39.5	139	120.4	69.5	199	172.3	99.5	259	224.3	129.5
20	17.3	10.0	80	69.3	40.0	140	121.2	70.0	200	173.2	100.0	260	225.2	130.0
21	18.2	10.5	81	70.1	40.5	141	122.1	70.5	201	174.1	100.5	261	226.0	130.5
22	19.1	11.0	82	71.0	41.0	142	123.0	71.0	202	174.9	101.0	262	226.9	131.0
23	19.9	11.5	83	71.9	41.5	143	123.8	71.5	203	175.8	101.5	263	227.8	131.5
24	20.8	12.0	84	72.7	42.0	144	124.7	72.0	204	176.7	102.0	264	228.6	132.0
25	21.7	12.5	85	73.6	42.5	145	125.6	72.5	205	177.5	102.5	265	229.5	132.5
26	22.5	13.0	86	74.5	43.0	146	126.4	73.0	206	178.4	103.0	266	230.4	133.0
27	23.4	13.5	87	75.3	43.5	147	127.3	73.5	207	179.3	103.5	267	231.2	133.5
28	24.2	14.0	88	76.2	44.0	148	128.2	74.0	208	180.1	104.0	268	232.1	134.0
29	25.1	14.5	89	77.1	44.5	149	129.0	74.5	209	181.0	104.5	269	233.0	134.5
30	26.0	15.0	90	77.9	45.0	150	129.9	75.0	210	181.9	105.0	270	233.8	135.0
31	26.8	15.5	91	78.8	45.5	151	130.8	75.5	211	182.7	105.5	271	834.7	135.5
32	27.7	16.0	92	79.7	46.0	152	131.6	76.0	212	183.6	106.0	272	235.6	136.0
33	28.6	16.5	93	80.5	46.5	153	132.5	76.5	213	184.5	106.5	273	236.4	136.5
34	29.4	17.0	94	81.4	47.0	154	133.4	77.0	214	185.3	107.0	274	237.3	137.0
35	30.3	17.5	95	82.3	47.5	155	134.2	77.5	215	186.2	107.5	275	238.2	137.5
36	31.2	18.0	96	83.1	48.0	156	135.1	78.0	216	187.1	108.0	276	239.0	138.0
37	32.0	18.5	97	84.0	48.5	157	136.0	78.5	217	187.9	108.5	277	239.9	138.5
38	32.9	19.0	98	84.9	49.0	158	136.8	79.0	218	188.8	109.0	278	240.8	139.0
39	33.8	19.5	99	85.7	49.5	159	137.7	79.5	219	189.7	109.5	279	241.6	139.5
40	34.6	20.0	100	86.6	50.0	160	138.6	80.0	220	190.6	110.0	280	242.5	140.0
41	35.5	20.5	101	87.5	50.5	161	139.4	80.5	221	191.4	110.5	281	243.4	140.5
42	36.4	21.0	102	88.3	51.0	162	140.3	81.0	222	192.3	111.0	282	244.2	141.0
43	37.2	21.5	103	89.2	51.5	163	141.2	81.5	223	193.1	111.5	283	245.1	141.5
44	38.1	22.0	104	90.1	52.0	164	142.0	82.0	224	194.0	112.0	284	246.0	142.0
45	39.0	22.5	105	90.9	52.5	165	142.9	82.5	225	194.9	112.5	285	246.8	142.5
46	39.8	23.0	106	91.8	53.0	166	143.8	83.0	226	195.7	113.0	286	247.7	143.0
47	40.7	23.5	107	92.7	53.5	167	144.6	83.5	227	196.6	113.5	287	248.5	143.5
48	41.6	24.0	108	93.5	54.0	168	145.5	84.0	228	197.5	114.0	288	249.4	144.0
49	42.4	24.5	109	94.4	54.5	169	146.4	84.5	229	198.3	114.5	289	250.3	144.5
50	43.3	25.0	110	95.3	55.0	170	147.2	85.0	230	199.2	115.0	290	251.1	145.0
51	44.2	25.5	111	96.1	55.5	171	148.1	85.5	231	200.1	115.5	291	252.0	145.5
52	45.0	26.0	112	97.0	56.0	172	149.0	86.0	232	200.9	116.0	292	252.9	146.0
53	45.9	26.5	113	97.9	56.5	173	149.8	86.5	233	201.8	116.5	293	253.7	146.5
54	46.8	27.0	114	98.7	57.0	174	150.7	87.0	234	202.6	117.0	294	254.6	147.0
55	47.6	27.5	115	99.6	57.5	175	151.6	87.5	235	203.5	117.5	295	255.5	147.5
56	48.5	28.0	116	100.5	58.0	176	152.4	88.0	236	204.4	118.0	296	256.3	148.0
57	49.4	28.5	117	101.3	58.5	177	153.3	88.5	237	205.2	118.5	297	257.2	148.5
58	50.2	29.0	118	102.2	59.0	178	154.2	89.0	238	206.1	119.0	298	258.1	149.0
59	51.1	29.5	119	103.1	59.5	179	155.0	89.5	239	207.0	119.5	299	258.9	149.5
60	52.0	30.0	120	103.9	60.0	180	155.9	90.0	240	207.8	120.0	300	259.8	150.0
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 60 Degrees.

TABLE II. Difference of Latitude and Departure for 31 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.9	00.5	61	52.3	31.4	121	103.7	62.3	181	155.1	93.2	241	206.6	124.1
2	01.7	01.0	62	53.1	31.9	122	104.6	62.8	182	156.0	93.7	242	207.4	124.6
3	02.6	01.5	63	54.0	32.4	123	105.4	63.3	183	156.9	94.3	243	208.3	125.2
4	03.4	02.1	64	54.9	33.0	124	106.3	63.9	184	157.7	94.8	244	209.1	125.7
5	04.3	02.6	65	55.7	33.5	125	107.1	64.4	185	158.6	95.3	245	210.0	126.2
6	05.1	03.1	66	56.6	34.0	126	108.0	64.9	186	159.4	95.8	246	210.9	126.7
7	06.0	03.6	67	57.4	34.5	127	108.9	65.4	187	160.3	96.3	247	211.7	127.2
8	06.9	04.1	68	58.3	35.0	128	109.7	65.9	188	161.1	96.8	248	212.6	127.7
9	07.7	04.6	69	59.1	35.5	129	110.6	66.4	189	162.0	97.3	249	213.4	128.2
10	08.6	05.2	70	60.0	36.1	130	111.4	67.0	190	162.9	97.9	250	214.3	128.8
11	09.4	05.7	71	60.9	36.6	131	112.3	67.5	191	163.7	98.4	251	215.1	129.3
12	10.3	06.2	72	61.7	37.1	132	113.1	68.0	192	164.6	98.9	252	216.0	129.8
13	11.1	06.7	73	62.6	37.6	133	114.0	68.5	193	165.4	99.4	253	216.9	130.3
14	12.0	07.2	74	63.4	38.1	134	114.9	69.0	194	166.3	99.9	254	217.7	130.8
15	12.9	07.7	75	64.3	38.6	135	115.7	69.5	195	167.1	100.4	255	218.6	131.3
16	13.7	08.2	76	65.1	39.1	136	116.6	70.0	196	168.0	100.9	256	219.4	131.8
17	14.6	08.8	77	66.0	39.7	137	117.4	70.6	197	168.9	101.5	257	220.3	132.4
18	15.4	09.3	78	66.9	40.2	138	118.3	71.1	198	169.7	102.0	258	221.1	132.9
19	16.3	09.8	79	67.7	40.7	139	119.1	71.6	199	170.6	102.5	259	222.0	133.4
20	17.1	10.3	80	68.6	41.2	140	120.0	72.1	200	171.4	103.0	260	222.9	133.9
21	18.0	10.8	81	69.4	41.7	141	120.9	72.6	201	172.3	103.5	261	223.7	134.4
22	18.9	11.3	82	70.3	42.2	142	121.7	73.1	202	173.1	104.0	262	224.6	134.9
23	19.7	11.8	83	71.1	42.7	143	122.6	73.7	203	174.0	104.6	263	225.4	135.5
24	20.6	12.4	84	72.0	43.3	144	123.4	74.2	204	174.9	105.1	264	226.3	136.0
25	21.4	12.9	85	72.9	43.8	145	124.3	74.7	205	175.7	105.6	265	227.1	136.5
26	22.3	13.4	86	73.7	44.3	146	125.1	75.2	206	176.6	106.1	266	228.0	137.0
27	23.1	13.9	87	74.6	44.8	147	126.0	75.7	207	177.4	106.6	267	228.9	137.5
28	24.0	14.4	88	75.4	45.3	148	126.9	76.2	208	178.3	107.1	268	229.7	138.0
29	24.9	14.9	89	76.3	45.8	149	127.7	76.7	209	179.1	107.6	269	230.6	138.5
30	25.7	15.5	90	77.1	46.4	150	128.6	77.3	210	180.0	108.2	270	231.4	139.1
31	26.6	16.0	91	78.0	46.9	151	129.4	77.8	211	180.9	108.7	271	232.3	139.6
32	27.4	16.5	92	78.9	47.4	152	130.3	78.3	212	181.7	109.2	272	233.1	140.1
33	28.3	17.0	93	79.7	47.9	153	131.1	78.8	213	182.6	109.7	273	234.0	140.6
34	29.1	17.5	94	80.6	48.4	154	132.0	79.3	214	183.4	110.2	274	234.9	141.1
35	30.0	18.0	95	81.4	48.9	155	132.9	79.8	215	184.3	110.7	275	235.7	141.6
36	30.9	18.5	96	82.3	49.4	156	133.7	80.3	216	185.1	111.2	276	236.6	142.2
37	31.7	19.1	97	83.1	50.0	157	134.6	80.9	217	186.0	111.8	277	237.4	142.7
38	32.6	19.6	98	84.0	50.5	158	135.4	81.4	218	186.9	112.3	278	238.3	143.2
39	33.4	20.1	99	84.9	51.0	159	136.3	81.9	219	187.7	112.8	279	239.1	143.7
40	34.3	20.6	100	85.7	51.5	160	137.1	82.4	220	188.6	113.3	280	240.0	144.2
41	35.1	21.1	101	86.6	52.0	161	138.0	82.9	221	189.4	113.8	281	240.9	144.7
42	36.0	21.6	102	87.4	52.5	162	138.9	83.4	222	190.3	114.3	282	241.7	145.2
43	36.9	22.1	103	88.3	53.0	163	139.7	84.0	223	191.1	114.9	283	242.6	145.8
44	37.7	22.7	104	89.1	53.6	164	140.6	84.5	224	192.0	115.4	284	243.4	146.3
45	38.6	23.2	105	90.0	54.1	165	141.4	85.0	225	192.9	115.9	285	244.3	146.8
46	39.4	23.7	106	90.9	54.6	166	142.3	85.5	226	193.7	116.4	286	245.1	147.3
47	40.3	24.2	107	91.7	55.1	167	143.1	86.0	227	194.6	116.9	287	246.0	147.8
48	41.1	24.7	108	92.6	55.6	168	144.0	86.5	228	195.4	117.4	288	246.9	148.3
49	42.0	25.2	109	93.4	56.1	169	144.9	87.0	229	196.3	117.9	289	247.7	148.8
50	42.9	25.8	110	94.3	56.7	170	145.7	87.6	230	197.1	118.5	290	248.6	149.4
51	43.7	26.3	111	95.1	57.2	171	146.6	88.1	231	198.0	119.0	291	249.4	149.9
52	44.6	26.8	112	96.0	57.7	172	147.4	88.6	232	198.9	119.5	292	250.3	150.4
53	45.4	27.3	113	96.9	58.2	173	148.3	89.1	233	199.7	120.0	293	251.2	150.9
54	46.3	27.8	114	97.7	58.7	174	149.1	89.6	234	200.6	120.5	294	252.0	151.4
55	47.1	28.3	115	98.6	59.2	175	150.0	90.1	235	201.4	121.0	295	252.9	151.9
56	48.0	28.8	116	99.4	59.7	176	150.9	90.6	236	202.3	121.5	296	253.7	152.5
57	48.9	29.4	117	100.3	60.3	177	151.7	91.2	237	203.1	122.1	297	254.6	153.0
58	49.7	29.9	118	101.1	60.8	178	152.6	91.7	238	204.0	122.6	298	255.4	153.5
59	50.6	30.4	119	102.0	61.3	179	153.4	92.2	239	204.9	123.1	299	256.3	154.0
60	51.4	30.9	120	102.9	61.8	180	154.3	92.7	240	205.7	123.6	300	257.1	154.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 59 Degrees.

TABLE II. Difference of Latitude and Departure for 32 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.5	61	51.7	32.3	121	102.6	64.1	181	153.5	95.9	241	204.4	127.7
2	01.7	01.1	62	52.6	32.9	122	103.5	64.7	182	154.3	96.4	242	205.2	128.2
3	02.5	01.6	63	53.4	33.4	123	104.3	65.2	183	155.2	97.0	243	206.1	128.8
4	03.4	02.1	64	54.3	33.9	124	105.2	65.7	184	156.0	97.5	244	206.9	129.3
5	04.2	02.6	65	55.1	34.4	125	106.0	66.2	185	156.9	98.0	245	207.8	129.8
6	05.1	03.2	66	56.0	35.0	126	106.9	66.8	186	157.7	98.6	246	208.6	130.4
7	05.9	03.7	67	56.8	35.5	127	107.7	67.3	187	158.6	99.1	247	209.5	130.9
8	06.8	04.2	68	57.7	36.0	128	108.6	67.8	188	159.4	99.6	248	210.3	131.4
9	07.6	04.8	69	58.5	36.6	129	109.4	68.4	189	160.3	100.2	249	211.2	131.9
10	08.5	05.3	70	59.4	37.1	130	110.2	68.9	190	161.1	100.7	250	212.0	132.5
11	09.3	05.8	71	60.2	37.6	131	111.1	69.4	191	162.0	101.2	251	212.9	133.0
12	10.2	06.4	72	61.1	38.2	132	111.9	69.9	192	162.8	101.7	252	213.7	133.5
13	11.0	06.9	73	61.9	38.7	133	112.8	70.5	193	163.7	102.3	253	214.6	134.1
14	11.9	07.4	74	62.8	39.2	134	113.6	71.0	194	164.5	102.8	254	215.4	134.6
15	12.7	07.9	75	63.6	39.7	135	114.5	71.5	195	165.4	103.3	255	216.3	135.1
16	13.6	08.5	76	64.5	40.3	136	115.3	72.1	196	166.2	103.9	256	217.1	135.7
17	14.4	09.0	77	65.3	40.8	137	116.2	72.6	197	167.1	104.4	257	217.9	136.2
18	15.3	09.5	78	66.1	41.3	138	117.0	73.1	198	167.9	104.9	258	218.8	136.7
19	16.1	10.1	79	67.0	41.9	139	117.9	73.7	199	168.8	105.5	259	219.6	137.2
20	17.0	10.6	80	67.8	42.4	140	118.7	74.2	200	169.6	106.0	260	220.5	137.8
21	17.8	11.1	81	68.7	42.9	141	119.6	74.7	201	170.5	106.5	261	221.3	138.3
22	18.7	11.7	82	69.5	43.5	142	120.4	75.2	202	171.3	107.0	262	222.2	138.8
23	19.5	12.2	83	70.4	44.0	143	121.3	75.8	203	172.2	107.6	263	223.0	139.4
24	20.4	12.7	84	71.2	44.5	144	122.1	76.3	204	173.0	108.1	264	223.9	139.9
25	21.2	13.2	85	72.1	45.0	145	123.0	76.8	205	173.8	108.6	265	224.7	140.4
26	22.0	13.8	86	72.9	45.6	146	123.8	77.4	206	174.7	109.2	266	225.6	141.0
27	22.9	14.3	87	73.8	46.1	147	124.7	77.9	207	175.5	109.7	267	226.4	141.5
28	23.7	14.8	88	74.6	46.6	148	125.5	78.4	208	176.4	110.2	268	227.3	142.0
29	24.6	15.4	89	75.5	47.2	149	126.4	79.0	209	177.2	110.8	269	228.1	142.5
30	25.4	15.9	90	76.3	47.7	150	127.2	79.5	210	178.1	111.3	270	229.0	143.1
31	26.3	16.4	91	77.2	48.2	151	128.1	80.0	211	178.9	111.8	271	229.8	143.6
32	27.1	17.0	92	78.0	48.8	152	128.9	80.5	212	179.8	112.3	272	230.7	144.1
33	28.0	17.5	93	78.9	49.3	153	129.8	81.1	213	180.6	112.9	273	231.5	144.7
34	28.8	18.0	94	79.7	49.8	154	130.6	81.6	214	181.5	113.4	274	232.4	145.2
35	29.7	18.5	95	80.6	50.3	155	131.4	82.1	215	182.3	113.9	275	233.2	145.7
36	30.5	19.1	96	81.4	50.9	156	132.3	82.7	216	183.2	114.5	276	234.1	146.3
37	31.4	19.6	97	82.3	51.4	157	133.1	83.2	217	184.0	115.0	277	234.9	146.8
38	32.2	20.1	98	83.1	51.9	158	134.0	83.7	218	184.9	115.5	278	235.8	147.3
39	33.1	20.7	99	84.0	52.5	159	134.8	84.3	219	185.7	116.1	279	236.6	147.8
40	33.9	21.2	100	84.8	53.0	160	135.7	84.8	220	186.6	116.6	280	237.5	148.4
41	34.8	21.7	101	85.7	53.5	161	136.5	85.3	221	187.4	117.1	281	238.3	148.9
42	35.6	22.3	102	86.5	54.1	162	137.4	85.8	222	188.3	117.6	282	239.1	149.4
43	36.5	22.8	103	87.3	54.6	163	138.2	86.4	223	189.1	118.2	283	240.0	150.0
44	37.3	23.3	104	88.2	55.1	164	139.1	86.9	224	190.0	118.7	284	240.8	150.5
45	38.2	23.8	105	89.0	55.6	165	139.9	87.4	225	190.8	119.2	285	241.7	151.0
46	39.0	24.4	106	89.9	56.2	166	140.8	88.0	226	191.7	119.8	286	242.5	151.6
47	39.9	24.9	107	90.7	56.7	167	141.6	88.5	227	192.5	120.3	287	243.4	152.1
48	40.7	25.4	108	91.6	57.2	168	142.5	89.0	228	193.4	120.8	288	244.2	152.6
49	41.6	26.0	109	92.4	57.8	169	143.3	89.6	229	194.2	121.4	289	245.1	153.1
50	42.4	26.5	110	93.3	58.3	170	144.2	90.1	230	195.1	121.9	290	245.9	153.7
51	43.3	27.0	111	94.1	58.8	171	145.0	90.6	231	195.9	122.4	291	246.8	154.2
52	44.1	27.6	112	95.0	59.4	172	145.9	91.1	232	196.7	122.9	292	247.6	154.7
53	44.9	28.1	113	95.8	59.9	173	146.7	91.7	233	197.6	123.5	293	248.5	155.3
54	45.8	28.6	114	96.7	60.4	174	147.6	92.2	234	198.4	124.0	294	249.3	155.8
55	46.6	29.1	115	97.5	60.9	175	148.4	92.7	235	199.3	124.5	295	250.2	156.3
56	47.5	29.7	116	98.4	61.5	176	149.3	93.3	236	200.1	125.1	296	251.0	156.9
57	48.3	30.2	117	99.2	62.0	177	150.1	93.8	237	201.0	125.6	297	251.9	157.4
58	49.2	30.7	118	100.1	62.5	178	151.0	94.3	238	201.8	126.1	298	252.7	157.9
59	50.0	31.3	119	100.9	63.1	179	151.8	94.9	239	202.7	126.7	299	253.6	158.4
60	50.9	31.8	120	101.8	63.6	180	152.6	95.4	240	203.5	127.2	300	254.4	159.0
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 58 Degrees.

TABLE II. Difference of Latitude and Departure for 33 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.5	61	51.2	33.2	121	101.5	65.9	181	151.8	98.6	241	202.1	131.3
2	01.7	01.1	62	52.0	33.8	122	102.3	66.4	182	152.6	99.1	242	203.0	131.8
3	02.5	01.6	63	52.8	34.3	123	103.2	67.0	183	153.5	99.7	243	203.8	132.3
4	03.4	02.2	64	53.7	34.9	124	104.0	67.5	184	154.3	100.2	244	204.6	132.9
5	04.2	02.7	65	54.5	35.4	125	104.8	68.1	185	155.2	100.8	245	205.5	133.4
6	05.0	03.3	66	55.4	35.9	126	105.7	68.6	186	156.0	101.3	246	206.3	134.0
7	05.9	03.8	67	56.2	36.5	127	106.5	69.2	187	156.8	101.8	247	207.2	134.5
8	06.7	04.4	68	57.0	37.0	128	107.3	69.7	188	157.7	102.4	248	208.0	135.1
9	07.5	04.9	69	57.9	37.6	129	108.2	70.3	189	158.5	102.9	249	208.8	135.6
10	08.4	05.4	70	58.7	38.1	130	109.0	70.8	190	159.3	103.5	250	209.7	136.2
11	09.2	06.0	71	59.5	38.7	131	109.9	71.3	191	160.2	104.0	251	210.5	136.7
12	10.1	06.5	72	60.4	39,2	132	110.7	71.9	192	161.0	104.6	252	211.3	137.2
13	10.9	07.1	73	61.2	39.8	133	111.5	72.4	193	161.9	105.1	253	212.2	137.8
14	11.7	07.6	74	62.1	40.3	134	112.4	73.0	194	162.7	105.7	254	213.0	138.3
15	12.6	08.2	75	62.9	40.8	135	113.2	73.5	195	163.5	106.2	255	213.9	138.9
16	13.4	08.7	76	63.7	41.4	136	114.1	74.1	196	164.4	106.7	256	214.7	139.4
17	14.3	09.3	77	64.6	41.9	137	114.9	74.6	197	165.2	107.3	257	215.5	140.0
18	15.1	09.8	78	65.4	42.5	138	115.7	75.2	198	166.1	107.8	258	216.4	140.5
19	15.9	10.3	79	66.3	43.0	139	116.6	75.7	199	166.9	108.4	259	217.2	141.1
20	16.8	10.9	80	67.1	43.6	140	117.4	76.2	200	167.7	108.9	260	218.1	141.6
21	17.6	11.4	81	67.9	44.1	141	118.3	76.8	201	168.6	109.5	261	218.9	142.2
22	18.5	12.0	82	68.8	44.7	142	119.1	77.3	202	169.4	110.0	262	219.7	142.7
23	19.3	12.5	83	69.6	45.2	143	119.9	77.9	203	170.3	110.6	263	220.6	143.2
24	20.1	13.1	84	70.4	45.7	144	120.8	78.4	204	171.1	111.1	264	221.4	143.8
25	21.0	13.6	85	71.3	46.3	145	121.6	79.0	205	171.9	111.7	265	222.2	144.3
26	21.8	14.2	86	72.1	46.8	146	122.4	79.5	206	172.8	112.2	266	223.1	144.9
27	22.6	14.7	87	73.0	47.4	147	123.3	80.1	207	173.6	112.7	267	223.9	145.4
28	23.5	15.2	88	73.8	47.9	148	124.1	80.6	208	174.4	113.3	268	224.8	146.0
29	24.3	15.8	89	74.6	48.5	149	125.0	81.2	209	175.3	113.8	269	225.6	146.5
30	25.2	16.3	90	75.5	49.0	150	125.8	81.7	210	176.1	114.4	270	226.4	147.1
31	26.0	16.9	91	76.3	49.6	151	126.6	82.2	211	177.0	114.9	271	227.3	147.6
32	26.8	17.4	92	77.2	50.1	152	127.5	82.8	212	177.8	115.5	272	228,1	148.1
33	27.7	18.0	93	78.0	50.7	153	128.3	83.3	213	178.6	116.0	273	229.0	148.7
34	28.5	18.5	94	78.8	51.2	154	129.2	83.9	214	179.4	116.6	274	229.8	149.2
35	29.4	19.1	95	79.7	51.7	155	130.0	84.4	215	180.3	117.1	275	230.6	149.8
36	30.2	19.6	96	80.5	52.3	156	130.8	85.0	216	181.2	117.6	276	231.5	150.3
37	31.0	20.2	97	81.4	52.8	157	131.7	85.5	217	182.0	118.2	277	232.3	150.9
38	31.9	20.7	98	82.2	53.4	158	132.5	86.1	218	182.8	118.7	278	233.2	151.4
39	32.7	21.2	99	83.0	53.9	159	133.3	86.6	219	183.7	119.3	279	234.0	152.0
40	33.5	21.8	100	83.9	54.5	160	134.2	87.1	220	184.5	119.8	280	234.8	152.5
41	34.4	22.3	101	84.7	55.0	161	135.0	87.7	221	185.3	120.4	281	235.7	153.0
42	35.2	22.9	102	85.5	55.6	162	135.9	88.2	222	186.2	120.9	282	236.5	153.6
43	36.1	23.4	103	86.4	56.1	163	136.7	88.8	223	187.0	121.5	283	237.3	154.1
44	36.9	24.0	104	87.2	56.6	164	137.5	89.3	224	187.9	122.0	284	238.2	154.7
45	37.7	24.5	105	88.1	57.2	165	138.4	89.9	225	188.7	122.5	285	239.0	155.2
46	38.6	25.1	106	88.9	57.7	166	139.2	90.4	226	189.5	123.1	286	239.9	155.8
47	39.4	25.6	107	89.7	58.3	167	140.1	91.0	227	190.4	123.6	287	240.7	156.3
48	40.3	26.1	108	90.6	58.8	168	140.9	91.5	228	191.2	124.2	288	241.5	156.9
49	41.1	26.7	109	91.4	59.4	169	141.7	92.0	229	192.1	124.7	289	242.4	157.4
50	41.9	27.2	110	92.3	59.9	170	142.6	92.6	230	192.9	125.3	290	243.2	157.9
51	42.8	27.8	111	93.1	60.5	171	143.4	93.1	231	193.7	125.8	291	244.1	158.5
52	43.6	28.3	112	93.9	61.0	172	144.3	93.7	232	194.6	126.4	292	244.9	159.0
53	44.4	28.9	113	94.8	61.5	173	145.1	94.2	233	195.4	126.9	293	245.7	159.6
54	45.3	29.4	114	95.6	62.1	174	145.9	94.8	234	196.2	127.4	294	246.6	160.1
55	46.1	30.0	115	96·4	62.6	175	146.8	95.3	235	197.1	128.0	295	247.4	160.7
56	47.0	30.5	116	97.3	63.2	176	147.6	95.9	236	197.9	128.5	296	248.2	161.2
57	47.8	31.0	117	98.1	63.7	177	148.4	96.4	237	198.8	129.1	297	249.1	161.8
58	48.6	31.6	118	99.0	64.3	178	149.3	96.9	238	199.6	129.6	298	249.9	162.3
59	49.5	32.1	119	99.8	64.8	179	150.1	97.5	239	200.4	130.2	299	250.8	162.8
60	50.3	32.7	120	100.6	65.4	180	151.0	98.0	240	201.3	130.7	300	251.6	163.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 57 Degrees.

TABLE II. Difference of Latitude and Departure for 34 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	50.6	34.1	121	100.3	67.7	181	150.1	101.2	241	199.8	134.8
2	01.7	01.1	62	51.4	34.7	122	101.1	68.2	182	150.9	101.8	242	200.6	135.3
3	02.5	01.7	63	52.2	35.2	123	102.0	68.8	183	151.7	102.3	243	201.5	135.9
4	03.3	02.2	64	53.1	35.8	124	102.8	69.3	184	152.5	102.9	244	202.3	136.4
5	04.1	02.8	65	53.9	36.3	125	103.6	69.9	185	153.4	103.5	245	203.1	137.0
6	05.0	03.4	66	54.7	36.9	126	104.5	70.5	186	154.2	104.0	246	203.9	137.6
7	05.8	03.9	67	55.5	37.5	127	105.3	71.0	187	155.0	104.6	247	204.8	138.1
8	06.6	04.5	68	56.4	38.0	128	106.1	71.6	188	155.9	105.1	248	205.6	138.7
9	07.5	05.0	69	57.2	38.6	129	106.9	72.1	189	156.7	105.7	249	206.4	139.2
10	08.3	05.6	70	58.0	39.1	130	107.8	72.7	190	157.5	106.2	250	207.3	139.8
11	09.1	06.2	71	58.9	39.7	131	108.6	73.3	191	158.3	106.8	251	208.1	140.4
12	09.9	06.7	72	59.7	40.3	132	109.4	73.8	192	159.2	107.4	252	208.9	140.9
13	10.8	07.3	73	60.5	40.8	133	110.3	74.4	193	160.0	107.9	253	209.7	141.5
14	11.6	07.8	74	61.3	41.4	134	111.1	74.9	194	160.8	108.5	254	210.6	142.0
15	12.4	08.4	75	62.2	41.9	135	111.9	75.5	195	161.7	109.0	255	211.4	142.6
16	13.3	08.9	76	63.0	42.5	136	112.7	76.1	196	162.5	109.6	256	212.2	143.2
17	14.1	09.5	77	63.8	43.1	137	113.6	76.6	197	163.3	110.2	257	213.1	143.7
18	14.9	10.1	78	64.7	43.6	138	114.4	77.2	198	164.1	110.7	258	213.9	144.3
19	15.8	10.6	79	65.5	44.2	139	115.2	77.7	199	165.0	111.3	259	214.7	144.8
20	16.6	11.2	80	66.3	44.7	140	116.1	78.3	200	165.8	111.8	260	215.5	145.4
21	17.4	11.7	81	67.2	45.3	141	116.9	78.8	201	166.6	112.4	261	216.4	145.9
22	18.2	12.3	82	68.0	45.9	142	117.7	79.4	202	167.5	113.0	262	217.2	146.5
23	19.1	12.9	83	68.8	46.4	143	118.6	80.0	203	168.3	113.5	263	218.0	147.1
24	19.9	13.4	84	69.6	47.0	144	119.4	80.5	204	169.1	114.1	264	218.9	147.6
25	20.7	14.0	85	70.5	47.5	145	120.2	81.1	205	170.0	114.6	265	219.7	148.2
26	21.6	14.5	86	71.3	48.1	146	121.0	81.6	206	170.8	115.2	266	220.5	148.7
27	22.4	15.1	87	72.1	48.6	147	121.9	82.2	207	171.6	115.8	267	221.4	149.3
28	23.2	15.7	88	73.0	49.2	148	122.7	82.8	208	172.4	116.3	268	222.2	149.9
29	24.0	16.2	89	73.8	49.8	149	123.5	83.3	209	173.3	116.9	269	223.0	150.4
30	24.9	16.8	90	74.6	50.3	150	124.4	83.9	210	174.1	117.4	270	223.8	151.0
31	25.7	17.3	91	75.4	50.9	151	125.2	84.4	211	174.9	118.0	271	224.7	151.5
32	26.5	17.9	92	76.3	51.4	152	126.0	85.0	212	175.8	118.5	272	225.5	152.1
33	27.4	18.5	93	77.1	52.0	153	126.8	85.6	213	176.6	119.1	273	226.3	152.7
34	28.2	19.0	94	77.9	52.6	154	127.7	86.1	214	177.4	119.7	274	227.2	153.2
35	29.0	19.6	95	78.8	53.1	155	128.5	86.7	215	178.2	120.2	275	228.0	153.8
36	29.8	20.1	96	79.6	53.7	156	129.3	87.2	216	179.1	120.8	276	228.8	154.3
37	30.7	20.7	97	80.4	54.2	157	130.2	87.8	217	179.9	121.3	277	229.6	154.9
38	31.5	21.2	98	81.2	54.8	158	131.0	88.4	218	180.7	121.9	278	230.5	155.5
39	32.3	21.8	99	82.1	55.4	159	113.8	88.9	219	181.6	122.5	279	231.3	156.0
40	33.2	22.4	100	82.9	55.9	160	132.6	89.5	220	182.4	123.0	280	232.1	156.6
41	34.0	22.9	101	83.7	56.5	161	133.5	90.0	221	183.2	123.6	281	233.0	157.1
42	34.8	23.5	102	84.6	57.0	162	134.3	90.6	222	184.0	124.1	282	233.8	157.7
43	35.6	24.0	103	85.4	57.6	163	135.1	91.1	223	184.9	124.7	283	234.6	158.3
44	36.5	24.6	104	86.2	58.2	164	136.0	91.7	224	185.7	125.3	284	235.4	158.8
45	37.3	25.2	105	87.0	58.7	165	136.8	92.3	225	186.5	125.8	285	236.3	159.4
46	38.1	25.7	106	87.9	59.3	166	137.6	92.8	226	187.4	126.4	286	237.1	159.9
47	39.0	26.3	107	88.7	59.8	167	138.4	93.4	227	188.2	126.9	287	237.9	160.5
48	39.8	26.8	108	89.5	60.4	168	139.3	93.9	228	189.0	127.5	288	238.8	161.0
49	40.6	27.4	109	90.4	61.0	169	140.1	94.5	229	189.8	128.1	289	239.6	161.6
50	41.5	28.0	110	91.2	61.5	170	140.9	95.1	230	190.7	128.6	290	240.4	162.2
51	42.3	28.5	111	92.0	62.1	171	141.8	95.6	231	191.5	129.2	291	241.2	162.7
52	43.1	29.1	112	92.9	62.6	172	142.6	96.2	232	192.3	129.7	292	242.1	163.3
53	43.9	29.6	113	93.7	63.2	173	143.4	96.7	233	193.2	130.3	293	242.9	163.8
54	44.8	30.2	114	94.5	63.7	174	144.3	97.3	234	194.0	130.9	294	243.7	164.4
55	45.6	30.8	115	95.3	64.3	175	145.1	97.9	235	194.8	131.4	295	244.6	165.0
56	46.4	31.3	116	96.2	64.9	176	145.9	98.4	236	195.7	132.0	296	245.4	165.5
57	47.3	31.9	117	97.0	65.4	177	146.7	99.0	237	196.5	132.5	297	246.2	166.1
58	48.1	32.4	118	97.8	66.0	178	147.6	99.5	238	197.3	133.1	298	247.1	166.6
59	48.9	33.0	119	98.7	66.5	179	148.4	100.1	239	198.1	133.6	299	247.9	167.2
60	49.7	33.6	120	99.5	67.1	180	149.2	100.7	240	199.0	134.2	300	248.7	167.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat	Dist	Dep	Lat.

For 56 Degrees.

TABLE II. Difference of Latitude and Departure for 35 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	50.0	35.0	121	99.1	69.4	181	148.3	103.8	241	197.4	138.2
2	01.6	01.1	62	50.8	35.6	122	99.9	70.0	182	149.1	104.4	242	198.2	138.8
3	02.5	01.7	63	51.6	36.1	123	100.8	70.5	183	149.9	105.0	243	199.1	139.4
4	03.3	02.3	64	52.4	36.7	124	101.6	71.1	184	150.7	105.5	244	199.9	140.0
5	04.1	02.9	65	53.2	37.3	125	102.4	71.7	185	151.5	106.1	245	200.7	140.5
6	04.9	03.4	66	54.1	37.9	126	103.2	72.3	186	152.4	106.7	246	201.5	141.1
7	05.7	04.0	67	54.9	38.4	127	104.0	72.8	187	153.2	107.3	247	202.3	141.7
8	06.6	04.6	68	55.7	39.0	128	104.9	73.4	188	154.0	107.8	248	203.1	142.2
9	07.4	05.2	69	56.5	39.6	129	105.7	74.0	189	154.8	108.4	249	204.0	142.8
10	08.2	05.7	70	57.3	40.2	130	106.5	74.6	190	155.6	109.0	250	204.8	143.4
11	09.0	06.3	71	58.2	40.7	131	107.3	75.1	191	156.5	109.6	251	205.6	144.0
12	09.8	06.9	72	59.0	41.3	132	108.1	75.7	192	157.3	110.1	252	206.4	144.5
13	10.6	07.5	73	59.8	41.9	133	108.9	76.3	193	158.1	110.7	253	207.2	145.1
14	11.5	08.0	74	60.6	42.4	134	109.8	76.9	194	158.9	111.3	254	208.1	145.7
15	12.3	08.6	75	61.4	43.0	135	110.6	77.4	195	159.7	111.8	255	208.9	146.3
16	13.1	09.2	76	62.3	43.6	136	111.4	78.0	196	160.6	112.4	256	209.7	146.8
17	13.9	09.8	77	63.1	44.2	137	112.2	78.6	197	161.4	113.0	257	210.5	147.4
18	14.7	10.3	78	63.9	44.7	138	113.0	79.2	198	162.2	113.6	258	211.3	148.0
19	15.6	10.9	79	64.7	45.3	139	113.9	79.7	199	163.0	114.1	259	212.2	148.6
20	16.4	11.5	80	65.5	45.9	140	114.7	80.3	200	163.8	114.7	260	213.0	149.1
21	17.2	12.0	81	66.4	46.5	141	115.5	80.9	201	164.6	115.3	261	213.8	149.7
22	18.0	12.6	82	67.2	47.0	142	116.3	81.4	202	165.5	115.9	262	214.6	150.3
23	18.8	13.2	83	68.0	47.6	143	117.1	82.0	203	166.3	116.4	263	215.4	150,9
24	19.7	13.8	84	68.8	48.2	144	118.0	82.6	204	167.1	117.0	264	216.3	151.4
25	20.5	14.3	85	69.6	48.8	145	118.8	83.2	205	167.9	117.6	265	217.1	152.0
26	21.3	14.9	86	70.4	49.3	146	119.6	83.7	206	168.7	118.2	266	217.9	152.6
27	22.1	15.5	87	71.3	49.9	147	120.4	84.3	207	169.6	118.7	267	218.7	153.1
28	22.9	16.1	88	72.1	50.5	148	121.2	84.9	208	170.4	119.3	268	219.5	153.7
29	23.8	16.6	89	72.9	51.0	149	122.1	85.5	209	171.2	119.9	269	220.4	154.3
30	24.6	17.2	90	73.7	51.6	150	122.9	86.0	210	172.0	120.5	270	221.2	154.9
31	25.4	17.8	91	74.5	52.2	151	123.7	86.6	211	172.8	121.0	271	222.0	155.4
32	26.2	18.4	92	75.4	52.8	152	124.5	87.2	212	173.7	121.6	272	222.8	156.0
33	27.0	18.9	93	76.2	53.3	153	125.3	87.8	213	174.5	122.2	273	223.6	156.6
34	27.9	19.5	94	77.0	53.9	154	126.1	88.3	214	175.3	122.7	274	224.4	157.2
35	28.7	20.1	95	77.8	54.5	155	127.0	88.9	215	176.1	123.3	275	225.3	157.7
36	29.5	20.6	96	78.6	55.1	156	127.8	89.5	216	176.9	123.9	276	226.1	158.3
37	30.3	21.2	97	79.5	55.6	157	128.6	90.1	217	177.8	124.5	277	226.9	158.9
38	31.1	21.8	98	80.3	56.2	158	129.4	90.6	218	178.6	125.0	278	227.7	159.5
39	31.9	22.4	99	81.1	56.8	159	130.2	91.2	219	179.4	125.6	279	228.5	160.0
40	32.8	22.9	100	81.9	57.4	160	131.1	91.8	220	180.2	126.2	280	229.4	160.6
41	33.6	23.5	101	82.7	57.9	161	131.9	92.3	221	181.0	126.8	281	230.2	161.2
42	34.4	24.1	102	83.6	58.5	162	132.7	92.9	222	181.9	127.3	282	231.0	161.7
43	35.2	24.7	103	84.4	59.1	163	133.5	93.5	223	182.7	127.9	283	231.8	162.3
44	36.0	25.2	104	85.2	59.7	164	134.3	94.1	224	183.5	128.5	284	232.6	162.9
45	36.9	25.8	105	86.0	60.2	165	135.2	94.6	225	184.3	129.1	285	233.5	163.3
46	37.7	26.4	106	86.8	60.8	166	136.0	95.2	226	185.1	129.6	286	234.3	164.0
47	38.5	27.0	107	87.6	61.4	167	136.8	95.8	227	185.9	130.2	287	235.1	164.6
48	39.3	27.5	108	88.5	61.9	168	137.6	96.4	228	186.8	130.8	288	235.9	165.2
49	40.1	28.1	109	89.3	62.5	169	138.4	96.9	229	187.9	131.3	289	236.7	165.8
50	41.0	28.7	110	90.1	63.1	170	139.3	97.5	230	188.4	131.9	290	237.6	166.3
51	41.8	29.3	111	90.9	63.7	171	140.1	98.1	231	189.2	132.5	291	238.4	166.9
52	42.6	29.8	112	91.7	64.2	172	140.9	98.7	232	190.0	133.1	292	239.2	167.5
53	43.4	30.4	113	92.6	64.8	173	141.7	99.2	233	190.9	133.6	293	240.0	168.1
54	44.2	31.0	114	93.4	65.4	174	142.5	99.8	234	191.7	134.2	294	240.8	168.6
55	45.1	31.5	115	94.2	66.0	175	143.4	100.4	235	192.5	134.8	295	241.6	169.2
56	45,9	32.1	116	95.0	66.5	176	144.2	100.9	236	193.3	135.4	296	242.5	169.8
57	46.7	32.7	117	95.8	67.1	177	145.0	101.5	237	194.1	135.9	297	243.3	170.4
58	47.5	33.3	118	96.7	67.7	178	145.8	102.1	238	195.0	136.5	298	244.1	170.9
59	48.3	33.8	119	97.5	68.3	179	146.6	102.7	239	195.8	137.1	299	244.9	171.5
60	49.1	34.4	120	98.3	68.8	180	147.4	103.2	240	196.6	137.7	300	245.7	172.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 55 Degrees.

TABLE II. Difference of Latitude and Departure for 36 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	49.4	35.9	121	97.9	71.1	181	146.4	106.4	241	195.0	141.7
2	01.6	01.2	62	50.2	36.4	122	98.7	71.7	182	147.2	107.0	242	195.8	142.2
3	02.4	01.8	63	51.0	37.0	123	99.5	72.3	183	148.1	107.6	243	196.6	142.8
4	03.2	02.4	64	51.8	37.6	124	100.3	72.9	184	148.9	108.2	244	197.4	143.4
5	04.0	02.9	65	52.6	38.2	125	101.1	73.5	185	149.7	108.7	245	198.2	144.0
6	04.9	03.5	66	53.4	38.8	126	101.9	74.1	186	150.5	109.3	246	199.0	144.6
7	05.7	04.1	67	54.2	39.4	127	102.7	74.6	187	151.3	109.9	247	199.8	145.2
8	06.5	04.7	68	55.0	40.0	128	103.6	75.2	188	152.1	110.5	248	200.6	145.8
9	07.3	05.3	69	55.8	40.6	129	104.4	75.8	189	152.9	111.1	249	201.4	146.4
10	08.1	05.9	70	56.6	41.1	130	105.2	76.4	190	153.7	111.7	250	202.3	146.9
11	08.9	06.5	71	57.4	41.7	131	106.0	77.0	191	154.5	112.3	251	203.1	147.5
12	09.7	07.1	72	58.2	42.3	132	106.8	77.6	192	155.3	112.9	252	203.9	148.1
13	10.4	07.6	73	59.1	42.9	133	107.6	78.2	193	156.1	113.4	253	204.7	148.7
14	11.3	08.2	74	59.9	43.5	134	108.4	78.8	194	156.9	114.0	254	205.5	149.3
15	12.1	08.8	75	60.7	44.1	135	109.2	79.4	195	157.8	114.6	255	206.3	149.9
16	12.9	09.4	76	61.5	44.7	136	110.0	79.9	196	158.6	115.2	256	207.1	150.5
17	13.8	10.0	77	62.3	45.3	137	110.8	80.5	197	159.4	115.8	257	207.9	151.1
18	14.6	10.6	78	63.1	45.8	138	111.6	81.0	198	160.2	116.4	258	208.7	151.6
19	15.4	11.2	79	63.9	46.4	139	112.5	81.7	199	161.0	117.0	259	209.5	152.2
20	16.2	11.8	80	64.7	47.0	140	113.3	82.3	200	161.8	117.6	260	210.3	152.8
21	17.0	12.3	81	65.5	47.6	141	114.1	82.9	201	162.6	118.1	261	211.2	153.4
22	17.8	12.9	82	66.3	48.2	142	114.9	83.5	202	163.4	118.7	262	212.0	154.0
23	18.6	13.5	83	67.1	48.8	143	115.7	84.1	203	164.2	119.3	263	212.8	154.6
24	19.4	14.1	84	68.0	49.4	144	116.5	84.6	204	165.0	119.9	264	213.6	155.2
25	20.2	14.7	85	68.8	50.0	145	117.3	85.2	205	165.8	120.5	265	214.4	155.8
26	21.0	15.3	86	69.6	50.5	146	118.1	85.8	206	166.7	121.1	266	215.2	156.4
27	21.8	15.9	87	70.4	51.1	147	118.9	86.4	207	167.5	121.7	267	216.0	156.9
28	22.7	16.5	88	71.2	51.7	148	119.7	87.0	208	168.3	122.3	268	216.8	157.5
29	23.5	17.0	89	72.0	52.3	149	120.5	87.6	209	169.1	122.8	269	217.6	158.1
30	24.3	17.6	90	72.8	52.9	150	121.4	88.2	210	169.9	123.4	270	218.4	158.7
31	25.1	18.2	91	73.6	53.5	151	122.2	88.8	211	170.7	124.0	271	219.2	159.3
32	25.9	18.8	92	74.4	54.1	152	123.0	89.3	212	171.5	124.6	272	220.1	159.9
33	26.7	19.4	93	75.2	54.7	153	123.8	89.9	213	172.3	125.2	273	220.9	160.5
34	27.5	20.0	94	76.0	55.3	154	124.6	90.5	214	173.1	125.8	274	221.7	161.1
35	28.3	20.6	95	76.9	55.8	155	125.4	91.1	215	173.9	126.4	275	222.5	161.6
36	29.1	21.2	96	77.7	56.4	156	126.2	91.7	216	174.7	127.0	276	223.3	162.2
37	29.9	21.7	97	78.5	57.0	157	127.0	92.3	217	175.6	127.5	277	224.1	162.8
38	30.7	22.3	98	79.3	57.6	158	127.8	92.9	218	176.4	128.1	278	224.9	163.4
39	31.6	22.9	99	80.1	58.2	159	128.6	93.5	219	177.2	128.7	279	225.7	164.0
40	32.4	23.5	100	80.9	58.8	160	129.4	94.0	220	178.0	129.3	280	226.5	164.6
41	33.3	24.1	101	81.7	59.4	161	130.3	94.6	221	178.8	129.9	281	227.3	165.2
42	34.0	24.7	102	82.5	60.0	162	131.1	95.2	222	179.6	130.5	282	228.1	165.8
43	34.8	25.3	103	83.3	60.5	163	131.9	95.8	223	180.4	131.1	283	229.0	166.3
44	35.6	25.9	104	84.1	61.1	164	132.7	96.4	224	181.2	131.7	284	229.8	166.9
45	36.4	26.5	105	84.9	61.7	165	133.5	97.0	225	182.0	132.3	285	230.6	167.5
46	37.2	27.0	106	85.8	62.3	166	134.3	97.6	226	182.8	132.8	286	231.4	168.1
47	38.0	27.6	107	86.6	62.9	167	135.1	98.2	227	183.6	133.4	287	232.2	168.7
48	38.8	28.2	108	87.4	63.5	168	135.9	98.7	228	184.5	134.0	288	233.0	169.3
49	39.6	28.8	109	88.2	64.1	169	136.7	99.3	229	185.3	134.6	289	233.8	169.9
50	40.5	29.4	110	89.0	64.7	170	137.5	99.9	230	186.1	135.2	290	234.6	170.5
51	41.3	30.0	111	89.8	65.2	171	138.3	100.5	231	186.9	135.8	291	235.4	171.0
52	42.1	30.6	112	90.6	65.8	172	139.2	101.1	232	187.7	136.4	292	236.2	171.6
53	42.9	31.2	113	91.4	66.4	173	140.0	101.7	233	188.5	137.0	293	237.0	172.2
54	43.7	31.7	114	92.2	67.0	174	140.8	102.3	234	189.3	137.5	294	237.9	172.8
55	44.5	32.3	115	93.0	67.6	175	141.6	102.9	235	190.1	138.1	295	238.7	173.4
56	45.3	32.9	116	93.8	68.2	176	142.4	103.5	236	190.9	138.7	296	239.5	174.0
57	46.1	33.5	117	94.7	68.8	177	143.2	104.0	237	191.7	139.3	297	240.3	174.6
58	46.9	34.1	118	95.5	69.4	178	144.0	104.6	238	192.5	139.9	298	241.1	175.2
59	47.7	31.7	119	96.3	69.9	179	144.8	105.2	239	193.4	140.5	299	241.9	175.7
60	48.5	35.3	120	97.1	70.5	180	145.6	105.8	240	194.2	141.1	300	242.7	176.3
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 54 Degrees.

TABLE II. Difference of Latitude and Departure for 37 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	48.7	36.7	121	96.6	72.8	181	144.6	108.9	241	192.5	145.0
2	01.6	01.2	62	49.5	37.3	122	97.4	73.4	182	145.4	109.5	242	193.3	145.6
3	02.4	01.8	63	50.3	37.9	123	98.2	74.0	183	146.2	110.1	243	194.1	146.2
4	03.2	02.4	64	51.1	38.5	124	99.0	74.6	184	146.9	110.7	244	194.9	146.8
5	04.0	03.0	65	51.9	39.1	125	99.8	75.2	185	147.7	111.3	245	195.7	147.4
6	04.8	03.6	66	52.7	39.7	126	100.6	75.8	186	148.5	111.9	246	196.5	148.0
7	05.6	04.2	67	53.5	40.3	127	101.4	76.4	187	149.3	112.5	247	197.3	148.6
8	06.4	04.8	68	54.3	40.9	128	102.2	77.0	188	150.1	113.1	248	198.1	149.3
9	07.2	05.4	69	55.1	41.5	129	103.0	77.6	189	150.9	113.7	249	198.9	149.9
10	08.0	06.0	70	55.9	42.1	130	103.8	78.2	190	151.7	114.3	250	199.7	150.5
11	08.8	06.6	71	56.7	42.7	131	104.6	78.8	191	152.5	114.9	251	200.5	151.1
12	09.6	07.2	72	57.5	43.3	132	105.4	79.4	192	153.3	115.5	252	201.3	151.7
13	10.4	07.8	73	58.3	43.9	133	106.2	80.0	193	154.1	116.2	253	202.1	152.3
14	11.2	08.4	74	59.1	44.5	134	107.0	80.6	194	154.9	116.8	254	202.9	152.9
15	12.0	09.0	75	59.9	45.1	135	107.8	81.2	195	155.7	117.4	255	203.7	153.5
16	12.8	09.6	76	60.7	45.7	136	108.6	81.8	196	156.5	118.0	256	204.5	154.1
17	13.6	10.2	77	61.5	46.3	137	109.4	82.4	197	157.3	118.6	257	205.2	154.7
18	14.4	10.8	78	62.3	46.9	138	110.2	83.1	198	158.1	119.2	258	206.0	155.3
19	15.2	11.4	79	63.1	47.5	139	111.0	83.7	199	158.9	119.8	259	206.8	155.9
20	16.0	12.0	80	63.9	48.1	140	111.8	84.3	200	159.7	120.4	260	207.6	156.5
21	16.8	12.6	81	64.7	48.7	141	112.6	84.9	201	160.5	121.0	261	208.4	157.1
22	17.6	13.2	82	65.5	49.3	142	113.4	85.5	202	161.3	121.6	262	209.2	157.7
23	18.4	13.8	83	66.3	50.0	143	114.2	86.1	203	162.1	122.2	263	210.0	158.3
24	19.2	14.4	84	67.1	50.6	144	115.0	86.7	204	162.9	122.8	264	210.8	158.9
25	20.0	15.0	85	67.9	51.2	145	115.8	87.3	205	163.7	123.4	265	211.6	159.5
26	20.8	15.6	86	68.7	51.8	146	116.6	87.9	206	164.5	124.0	266	212.4	160.1
27	21.6	16.2	87	69.5	52.4	147	117.4	88.5	207	165.3	124.6	267	213.2	160.7
28	22.4	16.9	88	70.3	53.0	148	118.2	89.1	208	166.1	125.2	268	214.0	161.3
29	23.2	17.5	89	71.1	53.6	149	119.0	89.7	209	166.9	125.8	269	214.8	161.9
30	24.0	18.1	90	71.9	54.2	150	119.8	90.3	210	167.7	126.4	270	215.6	162.5
31	24.8	18.7	91	72.7	54.8	151	120.6	90.9	211	168.5	127.0	271	216.4	163.1
32	25.6	19.3	92	73.5	55.4	152	121.4	91.5	212	169.3	127.6	272	217.2	163.7
33	26.4	19.9	93	74.3	56.0	153	122.2	92.1	213	170.1	128.2	273	218.0	164.3
34	27.2	20.5	94	75.1	56.6	154	123.0	92.7	214	170.9	128.8	274	218.8	164.9
35	28.0	21.1	95	75.9	57.2	155	123.8	93.3	215	171.7	129.4	275	219.6	165.5
36	28.8	21.7	96	76.7	57.8	156	124.6	93.9	216	172.5	130.0	276	220.4	166.1
37	29.5	22.3	97	77.5	58.4	157	125.4	94.5	217	173.3	130.6	277	221.2	166.7
38	30.3	22.9	98	78.3	59.0	158	126.2	95.1	218	174.1	131.2	278	222.0	167.3
39	31.1	23.5	99	79.1	59.6	159	127.0	95.7	219	174.9	131.8	279	222.8	167.9
40	31.9	24.1	100	79.9	60.2	160	127.8	96.3	220	175.7	132.4	280	223.6	168.5
41	32.7	24.7	101	80.7	60.8	161	128.6	96.9	221	176.5	133.0	281	224.4	169.1
42	33.5	25.3	102	81.5	61.4	162	129.4	97.5	222	177.3	133.6	282	225.2	169.7
43	34.3	25.9	103	82.3	62.0	163	130.2	98.1	223	178.1	134.2	283	226.0	170.3
44	35.1	26.5	104	83.1	62.6	164	131.0	98.7	224	178.9	134.8	284	226.8	170.9
45	35.9	27.1	105	83.9	63.2	165	131.8	99.3	225	179.7	135.4	285	227.6	171.5
46	36.7	27.7	106	84.7	63.8	166	132.6	99.9	226	180.5	136.0	286	228.4	172.1
47	37.5	28.3	107	85.5	64.4	167	133.4	100.5	227	181.3	136.6	287	229.2	172.7
48	38.3	28.9	108	86.3	65.0	168	134.2	101.1	228	182.1	137.2	288	230.0	173.3
49	39.1	29.5	109	87.1	65.6	169	135.0	101.7	229	182.9	137.8	289	230.8	173.9
50	39.9	30.1	110	87.8	66.2	170	135.8	102.3	230	183.7	138.4	290	231.6	174.5
51	40.7	30.7	111	88.6	66.8	171	136.6	102.9	231	184.5	139.0	291	232.4	175.1
52	41.5	31.3	112	89.4	67.4	172	137.4	103.5	232	185.3	139.6	292	233.2	175.7
53	42.3	31.9	113	90.2	68.0	173	138.2	104.1	233	186.1	140.2	293	234.0	176.3
54	43.1	32.5	114	91.0	68.6	174	139.0	104.7	234	186.9	140.8	294	234.8	176.9
55	43.9	33.1	115	91.8	69.2	175	139.8	105.3	235	187.7	141.4	295	235.6	177.5
56	44.7	33.7	116	92.6	69.8	176	140.6	105.9	236	188.5	142.0	296	236.4	178.1
57	45.5	34.3	117	93.4	70.4	177	141.4	106.5	237	189.3	142.6	297	237.2	178.7
58	46.3	34.9	118	94.2	71.0	178	142.2	107.1	238	190.1	143.2	298	238.0	179.3
59	47.1	35.5	119	95.0	71.6	179	143.0	107.7	239	190.9	143.8	299	238.8	179.9
60	47.9	36.1	120	95.8	72.2	180	143.8	108.3	240	191.7	144.4	300	239.6	180.5
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat	Dist	Dep	Lat

For 53 Degrees.

TABLE II. Difference of Latitude and Departure for 38 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	48.1	37.6	121	95.3	74.5	181	142.6	111.4	241	189.9	148.4
2	01.6	01.2	62	48.9	38.2	122	96.1	75.1	182	143.4	112.1	242	190.7	149.0
3	02.4	01.8	63	49.6	38.8	123	96.9	75.7	183	144.2	112.7	243	191.5	149.6
4	03.2	02.5	64	50.4	39.4	124	97.7	76.3	184	145.0	113.3	244	192.3	150.2
5	03.9	03.1	65	51.2	40.0	125	98.5	77.0	185	145.8	113.9	245	193.1	150.8
6	04.7	03.7	66	52.0	40.6	126	99.3	77.6	186	146.6	114.5	246	193.9	151.5
7	05.5	04.3	67	52.8	41.2	127	100.1	78.2	187	147.4	115.1	247	194.6	152.1
8	06.3	04.9	68	53.6	41.9	128	100.9	78.8	188	148.1	115.7	248	195.4	152.7
9	07.1	05.5	69	54.4	42.5	129	101.7	79.4	189	148.9	116.4	249	196.2	153.3
10	07.9	06.2	70	55.2	43.1	130	102.4	80.0	190	149.7	117.0	250	197.0	153.9
11	08.7	06.8	71	55.9	43.7	131	103.2	80.7	191	150.5	117.6	251	197.8	154.5
12	09.5	07.4	72	56.7	44.3	132	104.0	81.3	192	151.3	118.2	252	198.6	155.1
13	10.2	08.0	73	57.5	44.9	133	104.8	81.9	193	152.1	118.8	253	199.4	155.8
14	11.0	08.6	74	58.3	45.6	134	105.6	82.5	194	152.9	119.4	254	200.2	156.4
15	11.8	09.2	75	59.1	46.2	135	106.4	83.1	195	153.7	120.1	255	200.9	157.0
16	12.6	09.9	76	59.9	46.8	136	107.2	83.7	196	154.5	120.7	356	201.7	157.6
17	13.4	10.5	77	60.7	47.4	137	108.0	84.3	197	155.2	121.3	257	202.5	158.2
18	14.2	11.1	78	61.5	48.0	138	108.7	85.0	198	156.0	121.9	258	203.3	158.8
19	15.0	11.7	79	62.3	48.6	139	109.5	85.6	199	156.8	122.5	259	204.1	159.5
20	15.8	12.3	80	63.0	49.3	140	110.3	86.2	200	157.6	123.1	260	204.9	160.1
21	16.5	12.9	81	63.8	49.9	141	111.1	86.8	201	158.4	123.7	261	205.7	160.7
22	17.3	13.5	82	64.6	50.5	142	111.9	87.4	202	159.2	124.4	262	206.5	161.3
23	18.1	14.2	83	65.4	51.1	143	112.7	88.0	203	160.0	125.0	263	207.2	161.9
24	18.9	14.8	84	66.2	51.7	144	113.5	88.7	204	160.8	125.6	264	208.0	162.5
25	19.7	15.4	85	67.0	52.3	145	114.3	89.3	205	161.5	126.2	265	208.8	163.2
26	20.5	16.0	86	67.8	52.9	146	115.0	89.9	206	162.3	126.8	266	209.6	163.8
27	21.3	16.6	87	68.6	53.6	147	115.8	90.5	207	163.1	127.4	267	210.4	164.4
28	22.1	17.2	88	69.3	54.2	148	116.6	91.1	208	163.9	128.1	268	211.2	165.0
29	22.9	17.9	89	70.1	54.8	149	117.4	91.7	209	164.7	128.7	269	212.0	165.6
30	23.6	18.5	90	70.9	55.4	150	118.2	92.3	210	165.5	129.3	270	212.8	166.2
31	24.4	19.1	91	71.7	56.0	151	119.0	93.0	211	166.3	129.9	271	213.6	166.8
32	25.2	19.7	92	72.5	56.6	152	119.8	93.6	212	167.1	130.5	272	214.3	167.5
33	26.0	20.3	93	73.3	57.3	153	120.6	94.2	213	167.8	131.1	273	215.1	168.1
34	26.8	20.9	94	74.1	57.9	154	121.4	94.8	214	168.6	131.8	274	215.9	168.7
35	27.6	21.5	95	74.9	58.5	155	122.1	95.4	215	169.4	132.4	275	216.7	169.3
36	28.4	22.2	96	75.6	59.1	156	122.9	96.0	216	170.2	133.0	276	217.5	169.9
37	29.2	22.8	97	76.4	59.7	157	123.7	96.7	217	171.0	133.6	277	218.3	170.5
38	29.9	23.4	98	77.2	60.3	158	124.5	97.3	218	171.8	134.2	278	219.1	171.2
39	30.7	24.0	99	78.0	61.0	159	125.3	97.9	219	172.6	134.8	279	219.9	171.8
40	31.5	24.6	100	78.8	61.6	160	126.1	98.5	220	173.4	135.4	280	220.6	172.4
41	32.3	25.2	101	79.6	62.2	161	126.9	99.1	221	174.2	136.1	281	221.4	173.0
42	33.1	25.9	102	80.4	62.8	162	127.7	99.7	222	174.9	136.7	282	222.2	173.6
43	33.9	26.5	103	81.2	63.4	163	128.4	100.4	223	175.7	137.3	283	223.0	174.2
44	34.7	27.1	104	82.0	64.0	164	129.2	101.0	224	176.5	137.9	284	223.8	174.8
45	35.5	27.7	105	82.7	64.6	165	130.0	101.6	225	177.3	138.5	285	224.6	175.5
46	36.2	28.3	106	83.5	65.3	166	130.8	102.2	226	178.1	139.1	286	225.4	176.1
47	37.0	28.9	107	84.3	65.9	167	131.6	102.8	227	178.9	139.8	287	226.2	176.7
48	37.8	29.6	108	85.1	66.5	168	132.4	103.4	228	179.7	140.4	288	226.9	177.3
49	38.6	30.2	109	85.9	67.1	169	133.2	104.0	229	180.5	141.0	289	227.7	177.9
50	39.4	30.8	110	86.7	67.7	170	134.0	104.7	230	181.2	141.6	290	228.5	178.5
51	40.2	31.4	111	87.5	68.3	171	134.7	105.3	231	182.0	142.2	291	229.3	179.2
52	41.0	32.0	112	88.3	69.0	172	135.5	105.9	232	182.8	142.8	292	230.1	179.8
53	41.8	32.6	113	89.0	69.6	173	136.3	106.5	233	183.6	143.4	293	230.9	180.4
54	42.6	33.2	114	89.8	70.2	174	137.1	107.1	234	184.4	144.1	294	231.7	181.0
55	43.3	33.9	115	90.6	70.8	175	137.9	107.7	235	185.2	144.7	295	232.5	181.6
56	44.1	34.5	116	91.4	71.4	176	138.7	108.4	236	186.0	145.3	296	233.3	182.2
57	44.9	35.1	117	92.2	72.0	177	139.5	109.0	237	186.8	145.9	297	234.0	182.9
58	45.7	35.7	118	93.0	72.6	178	140.3	109.6	238	187.5	146.5	298	234.8	183.5
59	46.5	36.3	119	93.8	73.3	179	141.1	110.2	239	188.3	147.1	299	235.6	184.1
60	47.3	36.9	120	94.6	73.9	180	141.8	110.8	240	189.1	147.8	300	236.4	184.7
Dist	Dep	Lat.	Dis	Dep	Lat	Dist	Dep	Lat	Dis	Dep	Lat.	Dist	Dep	Lat

For 52 Degrees.

TABLE II. Difference of Latitude and Departure for 39 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	47.4	38.4	121	94.0	76.1	181	140.7	113.9	241	187.3	151.7
2	01.6	01.3	62	48.2	39.0	122	94.8	76.8	182	141.4	114.5	242	188.1	152.3
3	02.3	01.9	63	49.0	39.6	123	95.6	77.4	183	142.2	115.2	243	188.8	152.9
4	03.1	02.5	64	49.7	40.3	124	96.4	78.0	184	143.0	115.8	244	189.6	153.6
5	03.9	02.1	65	50.5	40.9	125	97.1	78.7	185	143.8	116.4	245	190.4	154.2
6	04.7	03.8	66	51.3	41.5	126	97.9	79.3	186	144.5	117.1	246	191.2	154.8
7	05.4	04.4	67	52.1	42.2	127	98.7	79.9	187	145.3	117.7	247	192.0	155.4
8	06.2	05.0	68	52.8	42.8	128	99.5	80.6	188	146.1	118.3	248	192.7	156.1
9	07.0	05.7	69	53.6	43.4	129	100.3	81.2	189	146.9	118.9	249	193.5	156.7
10	07.8	06.3	70	54.4	44.1	130	101.0	81.8	190	147.7	119.6	250	194.3	157.3
11	08.5	06.9	71	55.2	44.7	131	101.8	82.4	191	148.4	120.2	251	195.1	158.0
12	09.3	07.6	72	56.0	45.3	132	102.6	83.1	192	149.2	120.8	252	195.8	158.6
13	10.1	08.2	73	56.7	45.9	133	103.4	83.7	193	150.0	121.5	253	196.6	159.2
14	10.9	08.8	74	57.5	46.6	134	104.1	84.3	194	150.8	122.1	254	197.4	159.8
15	11.7	09.4	75	58.3	47.2	135	104.9	85.0	195	151.5	122.7	255	198.2	160.5
16	12.4	10.1	76	59.1	47.8	136	105.7	85.6	196	152.3	123.3	256	198.9	161.1
17	13.2	10.7	77	59.8	48.5	137	106.5	86.2	197	153.1	124.0	257	199.7	161.7
18	14.0	11.3	78	60.6	49.1	138	107.2	86.8	198	153.9	124.6	258	200.5	162.4
19	14.8	12.0	79	61.4	49.7	139	108.0	87.5	199	154.7	125.2	259	201.3	163.0
20	15.5	12.6	80	62.2	50.3	140	108.8	88.1	200	155.4	125.9	260	202.1	163.6
21	16.3	13.2	81	62.9	51.0	141	109.6	88.7	201	156.2	126.5	261	202.8	164.3
22	17.1	13.8	82	63.7	51.6	142	110.4	89.4	202	157.0	127.1	262	203.6	164.9
23	17.9	14.5	83	64.5	52.2	143	111.1	90.0	203	157.8	127.8	263	204.4	165.5
24	18.7	15.1	84	65.3	52.9	144	111.9	90.6	204	158.5	128.4	264	205.2	166.1
25	19.4	15.7	85	66.1	53.5	145	112.7	91.3	205	159.3	129.0	265	205.9	166.8
26	20.2	16.4	86	66.8	54.1	146	113.5	91.9	206	160.1	129.6	266	206.7	167.4
27	21.0	17.0	87	67.6	54.8	147	114.2	92.5	207	160.9	130.3	267	207.5	168.0
28	21.8	17.6	88	68.4	55.4	148	115.0	93.1	208	161.6	130.9	268	208.3	168.7
29	22.5	18.3	89	69.2	56.0	149	115.8	93.8	209	162.4	131.5	269	209.1	169.3
30	23.3	18.9	90	69.9	56.6	150	116.6	94.4	210	163.2	132.2	270	209.8	169.9
31	24.1	19.5	91	70.7	57.3	151	117.3	95.0	211	164.0	132.8	271	210.6	170.5
32	24.9	20.1	92	71.5	57.9	152	118.1	95.7	212	164.8	133.4	272	211.4	171.2
33	25.6	20.8	93	72.3	58.5	153	118.9	96.3	213	165.5	134.0	273	212.2	171.8
34	26.4	21.4	94	73.1	59.2	154	119.7	96.9	214	166.3	134.7	274	212.9	172.4
35	27.2	22.0	95	73.8	59.8	155	120.5	97.5	215	167.1	135.3	275	213.7	173.1
36	28.0	22.7	96	74.6	60.4	156	121.2	98.2	216	167.9	135.9	276	214.5	173.7
37	28.8	23.3	97	75.4	61.0	157	122.0	98.8	217	168.6	136.6	277	215.3	174.3
38	29.5	23.9	98	76.2	61.7	158	122.8	99.4	218	169.4	137.2	278	216.0	175.0
39	30.3	24.5	99	76.9	62.3	159	123.6	100.1	219	170.2	137.8	279	216.8	175.6
40	31.1	25.2	100	77.7	62.9	160	124.3	100.7	220	171.0	138.5	280	217.6	176.2
41	31.9	25.8	101	78.5	63.6	161	125.1	101.3	221	171.7	139.1	281	218.4	176.8
42	32.6	26.4	102	79.3	64.2	162	125.9	101.9	222	172.5	139.7	282	219.2	177.5
43	33.4	27.1	103	80.0	64.8	163	126.7	102.6	223	173.3	140.3	283	219.9	178.1
44	34.1	27.7	104	80.8	65.4	164	127.5	103.2	224	174.1	141.0	284	220.7	178.7
45	35.0	28.3	105	81.6	66.1	165	128.2	103.8	225	174.9	141.6	285	221.5	179.4
46	35.7	28.9	106	82.4	66.7	166	129.0	104.5	226	175.6	142.2	286	222.3	180.0
47	36.5	29.6	107	83.2	67.3	167	129.8	105.1	227	176.4	142.9	287	223.0	180.6
48	37.3	30.2	108	83.9	68.0	168	130.6	105.7	228	177.2	143.5	288	223.8	181.2
49	38.1	30.8	109	84.7	68.6	169	131.3	106.4	229	178.0	144.1	289	224.6	181.9
50	38.9	31.5	110	85.5	69.2	170	132.1	107.0	230	178.7	144.7	290	225.4	182.5
51	39.6	32.1	111	86.3	69.9	171	132.9	107.6	231	179.5	145.4	291	226.1	183.1
52	40.4	32.7	112	87.0	70.5	172	133.7	108.2	232	180.3	146.0	292	226.9	183.8
53	41.2	33.4	113	87.8	71.1	173	134.4	108.9	233	181.1	146.6	293	227.7	184.4
54	42.0	34.0	114	88.6	71.7	174	135.2	109.5	234	181.9	147.3	294	228.5	185.0
55	42.7	34.6	115	89.4	72.4	175	136.0	110.1	235	182.6	147.9	295	229.3	185.6
56	43.5	35.2	116	90.1	73.0	176	136.8	110.8	236	183.4	148.5	296	230.0	186.3
57	44.3	35.9	117	90.9	73.6	177	137.6	111.4	237	184.2	149.1	297	230.8	186.9
58	45.1	36.5	118	91.7	74.3	178	138.3	112.0	238	185.0	149.8	298	231.6	187.5
59	45.9	37.1	119	92.5	74.9	179	139.1	112.6	239	185.7	150.4	299	232.4	188.2
60	46.6	37.8	120	93.3	75.5	180	139.9	113.3	240	186.3	151.0	300	233.1	188.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 51 Degrees.

TABLE II. Difference of Latitude and Departure for 40 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.6	61	46.7	39.2	121	92.7	77.8	181	138.7	116.3	241	184.6	154.9
2	01.5	01.8	62	47.5	39.9	122	93.5	78.4	182	139.4	117.0	242	185.4	155.6
3	02.3	01.9	63	48.3	40.5	123	94.2	79.1	183	140.2	117.6	243	186.1	156.2
4	03.1	02.6	64	49.0	41.1	124	95.0	79.7	184	141.0	118.3	244	186.9	156.8
5	03.8	03.2	65	49.8	41.8	125	95.8	80.3	185	141.7	118.9	245	187.7	157.5
6	04.6	03.9	66	50.6	42.4	126	96.5	81.0	186	142.5	119.6	246	188.4	158.1
7	05.4	04.5	67	51.3	43.1	127	97.3	81.6	187	143.3	120.2	247	189.2	158.8
8	06.1	05.1	68	52.1	43.7	128	98.1	82.3	188	144.0	120.8	248	190.0	159.4
9	06.9	05.8	69	52.9	44.4	129	98.8	82.9	189	144.8	121.5	249	190.7	160.1
10	07.7	06.4	70	53.6	45.0	130	99.6	83.6	190	145.5	122.1	250	191.5	160.7
11	08.4	07.1	71	54.4	45.6	131	100.4	84.2	191	146.3	122.8	251	192.3	161.3
12	09.2	07.7	72	55.2	46.3	132	101.1	84.8	192	147.1	123.4	252	193.0	162.0
13	10.0	08.4	73	55.9	46.9	133	101.9	85.5	193	147.8	124.1	253	293.8	162.6
14	10.7	09.0	74	56.7	47.6	134	102.6	86.1	194	148.6	124.7	254	194.6	163.3
15	11.5	09.6	75	57.5	48.2	135	103.4	86.8	195	149.4	125.3	255	195.3	163.9
16	12.3	10.3	76	58.2	48.9	136	104.2	87.4	196	150.1	126.0	256	196.1	164.6
17	13.0	10.9	77	59.0	49.5	137	104.9	88.1	197	150.9	126.6	257	196.9	165.2
18	13.8	11.6	78	59.8	50.1	138	105.7	88.7	198	151.7	127.3	258	197.6	165.8
19	14.6	12.2	79	60.5	50.8	139	106.5	89.3	199	152.4	127.9	259	198.4	166.5
20	15.3	12.9	80	61.3	51.4	140	107.2	90.0	200	153.2	128.6	260	199.2	167.1
21	16.1	13.5	81	62.0	52.1	141	108.0	90.6	201	154.0	129.2	261	199.9	167.8
22	16.9	14.1	82	62.8	52.7	142	108.8	91.3	202	154.7	129.8	262	200.7	168.4
23	17.6	14.8	83	63.6	53.4	143	109.5	91.9	203	155.5	130.5	263	201.5	169.1
24	18.4	15.4	84	64.3	54.0	144	110.3	92.6	204	156.3	131.1	264	202.2	169.7
25	19.2	16.1	85	65.1	54.6	145	111.1	93.2	205	157.0	131.8	265	203.0	170.3
26	19.9	16.7	86	65.9	55.3	146	111.8	93.8	206	157.8	132.4	266	203.8	171.0
27	20.7	17.4	87	66.6	55.9	147	112.6	94.5	207	158.6	133.1	267	204.5	171.6
28	21.4	18.0	88	67.4	56.6	148	113.4	95.1	208	159.3	133.7	268	205.3	172.3
29	22.2	18.6	89	68.2	57.2	149	114.1	95.8	209	160.1	134.3	269	206.1	172.9
30	23.0	19.3	90	68.9	57.9	150	114.9	96.4	210	160.9	135.0	270	106.8	173.6
31	23.7	19.9	91	69.7	58.5	151	115.7	97.1	211	161.6	135.6	271	207.6	174.2
32	24.5	20.6	92	70.5	59.1	152	116.4	97.7	212	162.4	136.3	272	208.4	174.8
33	25.3	21.2	93	71.2	59.8	153	117.2	98.3	213	163.2	136.9	273	209.1	175.5
34	26.0	21.9	94	72.0	60.4	154	118.0	99.0	214	163.9	137.6	274	209.9	176.1
35	26.8	22.5	95	72.8	61.1	155	118.7	99.6	215	164.7	138.2	275	210.7	176.8
36	27.6	23.1	96	73.5	61.7	156	119.5	100.3	216	165.5	138.8	276	211.4	177.4
37	28.3	23.8	97	74.3	62.4	157	120.3	100.9	217	166.2	139.5	277	212.2	178.1
38	29.1	24.4	98	75.1	63.0	158	121.0	101.6	218	167.0	140.1	278	213.0	178.7
39	29.9	25.1	99	75.8	63.6	159	121.8	102.2	219	167.8	140.8	279	213.7	179.3
40	30.6	25.7	100	76.6	64.3	160	122.6	102.8	220	168.5	141.4	280	214.5	180.0
41	31.4	26.4	101	77.4	64.9	161	123.3	103.5	221	169.3	142.1	281	215.3	180.6
42	32.2	27.0	102	78.1	65.6	162	124.1	104.1	222	170.1	142.7	282	216.0	181.3
43	32.9	27.6	103	78.9	66.2	163	124.9	104.8	223	170.8	143.3	283	216.8	181.9
44	33.7	28.3	104	79.7	66.8	164	125.6	105.4	224	171.6	144.0	284	217.6	182.6
45	34.5	28.9	105	80.4	67.5	165	126.4	106.1	225	172.4	144.6	285	218.3	183.2
46	35.2	29.6	106	81.2	68.1	166	127.2	106.7	226	173.1	145.3	286	219.1	183.8
47	36.0	30.2	107	82.0	68.8	167	127.9	107.3	227	173.9	145.9	287	219.9	184.5
48	36.8	30.9	108	82.7	69.4	168	128.7	108.0	228	174.7	146.6	288	220.6	185.1
49	37.5	31.5	109	83.5	70.1	169	129.5	108.6	229	175.4	147.2	289	221.4	185.8
50	38.3	32.1	110	84.3	70.7	170	130.2	109.3	230	176.2	147.8	290	222.1	186.4
51	39.1	32.8	111	85.0	71.3	171	131.0	109.9	231	177.0	148.5	291	222.9	187.1
52	39.8	33.4	112	85.8	72.0	172	131.8	110.6	232	177.7	149.1	292	223.7	187.7
53	40.6	34.1	113	86.6	72.6	173	132.5	111.2	233	178.5	149.8	293	224.5	188.3
54	41.4	34.7	114	87.3	73.3	174	133.3	111.8	234	179.3	150.4	294	225.2	189.0
55	42.1	35.4	115	88.1	73.9	175	134.1	112.5	235	180.0	151.1	295	226.0	189.6
56	42.9	36.0	116	88.9	74.6	176	134.8	113.1	236	180.8	451.7	296	226.7	190.3
57	43.7	36.6	117	89.6	75.2	177	135.6	113.8	237	181.6	152.3	297	227.5	190.9
58	44.4	37.3	118	90.4	75.8	178	136.4	114.4	238	182.3	153.0	298	228.3	191.6
59	45.2	37.9	119	91.2	76.5	179	137.1	115.1	239	183.1	153.6	299	229.0	192.2
60	46.0	38.6	120	91.9	77.1	180	137.9	115.7	240	183.9	154.3	300	229.8	192.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 50 Degrees.

TABLE II. Difference of Latitude and Departure for 41 Degrees

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.8	00.7	61	46.0	40.0	121	91.3	79.4	181	136.6	118.7	241	181.9	158.1
2	01.5	01.3	62	46.8	40.7	122	92.1	80.0	182	137.4	119.4	242	182.6	158.8
3	02.3	02.0	63	47.5	41.3	123	92.8	80.7	183	138.1	120.1	243	183.4	159.4
4	03.0	02.6	64	48.3	42.0	124	93.6	81.4	184	138.9	120.7	244	184.1	160.1
5	03.8	03.3	65	49.1	42.6	125	94.3	82.0	185	139.6	121.4	245	184.9	160.7
6	04.5	03.9	66	49.8	43.3	126	95.1	82.7	186	140.4	122.0	246	185.7	161.4
7	05.3	04.6	67	50.6	44.0	127	95.8	83.3	187	141.1	122.7	247	186.4	162.0
8	06.0	05.2	68	51.3	44.6	128	96.6	84.0	188	141.9	123.3	248	187.2	162.7
9	06.8	05.9	69	52.1	45.3	129	97.4	84.6	189	142.6	124.0	249	187.9	163.4
10	07.5	06.6	70	52.8	45.9	130	98.1	85.3	190	143.4	124.7	250	188.7	164.0
11	08.3	07.2	71	53.6	46.6	131	98.9	85.9	191	144.1	125.3	251	189.4	164.7
12	09.1	07.9	72	54.3	47.2	132	99.6	86.6	192	144.9	126.0	252	190.2	165.3
13	09.8	08.5	73	55.1	47.9	133	100.4	87.3	193	145.7	126.6	253	190.9	166.0
14	10.6	09.2	74	55.8	48.5	134	101.1	87.9	194	146.4	127.3	254	191.7	166.6
15	11.3	09.8	75	56.6	49.2	135	101.9	88.6	195	147.2	127.9	255	192.5	167.3
16	12.1	10.5	76	57.4	49.9	136	102.6	89.2	196	147.9	128.6	256	193.2	168.0
17	12.8	11.2	77	58.1	50.5	137	103.4	89.9	197	148.7	129.2	257	194.0	168.6
18	13.6	11.8	78	58.9	51.2	138	104.1	90.5	198	149.4	129.9	258	194.7	169.3
19	14.3	12.5	79	59.6	51.8	139	104.9	91.2	199	150.2	130.6	259	195.5	169.9
20	15.1	13.1	80	60.4	52.5	140	105.7	91.8	200	150.9	131.2	260	196.2	170.6
21	15.8	13.8	81	61.1	53.1	141	106.4	92.5	201	151.7	131.9	261	197.0	171.2
22	16.6	14.4	82	61.9	53.8	142	107.2	93.2	202	152.5	132.5	262	197.7	171.9
23	17.4	15.1	83	62.6	54.5	143	107.9	93.8	203	153.2	133.2	263	198.5	172.5
24	18.1	15.7	84	63.4	55.1	144	108.7	94.5	204	154.0	133.8	264	199.2	173.2
25	18.9	16.4	85	64 2	55.8	145	109.4	95.1	205	154.7	134.5	265	200.0	173.9
26	19.6	17.1	86	64.9	56.4	146	110.2	95.8	206	155.5	135.1	266	200.8	174.5
27	20.4	17.7	87	65.7	57.1	147	110.9	96.4	207	156.2	135.8	267	201.5	175.2
28	21.1	18.4	88	66.4	57.7	148	111.7	97.1	208	157.0	136.5	268	202.3	175.8
29	21.9	19.0	89	67.2	58.4	149	112.5	97.8	209	157.7	137.1	269	203.0	176.5
30	22.6	19.7	90	67.9	59.0	150	113.2	98.4	210	158.5	137.8	270	203.8	177.1
31	23.4	20.3	91	68.7	59.7	151	114.0	99.1	211	159.2	138.4	271	204.5	177.8
32	24.2	21.0	92	69.4	60.4	152	114.7	99.7	212	160.0	139.1	272	205.3	178.4
33	24.9	21.6	93	70.2	61.0	153	115.5	100.4	213	160.8	139.7	273	206.0	179.1
34	25.7	22.3	94	70.9	61.7	154	116.2	101.0	214	161.5	140.4	274	206.8	179.8
35	26.4	23.0	95	71.7	62.3	155	117.0	101.7	215	162.3	141.1	275	207.5	180.4
36	27.2	23.6	96	72.5	63.0	156	117.7	102.3	216	163.0	141.7	276	208.3	181.1
37	27.9	24.3	97	73.2	63.6	157	118.5	103.0	217	163.8	142.4	277	209 1	181.7
38	28.7	24.9	98	74.0	64.3	158	119.2	103.7	218	164.5	143.0	278	209.8	182.4
39	29.4	25.6	99	74.7	64.9	159	120.0	104.3	219	165.3	143.7	279	210.6	183.0
40	30.2	26 2	100	75.5	65.6	160	120.8	105.0	220	166.0	144.3	280	211.3	183.7
41	30.9	26.9	101	76.2	66.3	161	121.5	105.6	221	166.8	145.0	281	212.1	184.4
42	31.7	27.6	102	77.0	66.9	162	122.3	106.3	222	167.5	145.6	282	212.8	185.0
43	32.5	28.2	103	77.7	67.6	163	123.0	106.9	223	168.3	146.3	283	213.6	185.7
44	33.2	28.9	104	78.5	68.2	164	123.8	107.6	224	169.1	147.0	284	214.3	186.3
45	34.0	29.5	105	79.2	68.9	165	124.5	108.2	225	169.8	147.6	285	215.1	187.0
46	34.7	30.2	106	80.0	69.5	166	125.3	108.9	226	170.6	148.3	286	215.8	187.6
47	35.5	30.8	107	80.8	70.2	167	126.0	109.6	227	171.3	148.9	287	216.6	188.3
48	36.2	31.5	108	81.5	70.9	168	126.8	110.2	228	172.1	149.6	288	217.4	188.9
49	37.0	32.1	109	82.3	71.5	169	127.5	110.9	229	172.8	150.2	289	218.1	189.6
50	37.7	32.8	110	83.0	72.2	170	128.3	111.5	230	173.6	150.9	290	218.9	190.3
51	38.5	33.5	111	83 8	72.8	171	129.1	112.2	231	174.3	151.5	291	219.6	190.9
52	39.2	34.1	112	84.5	73.5	172	129.8	112.8	232	175.1	152.2	292	220.4	191.6
53	40.0	34.8	113	85.3	74.1	173	130.6	113.5	233	175.8	152.9	293	221.1	192.2
54	40.8	35.4	114	86.0	74.8	174	131.3	114.2	234	176.6	153.5	294	221.9	192.9
55	41.5	36.1	115	86.8	75.4	175	132.1	114.8	235	177.4	154.2	295	222.6	193.5
56	42.3	36.7	116	87.5	76.1	176	132.8	115 5	236	178.1	154.8	296	223.4	194.2
57	43.0	37.4	117	88.3	76.8	177	133.6	116.1	237	178.9	155.5	297	224.1	194.8
58	43.8	38.1	118	89.1	77.4	178	134.3	116.8	238	179.6	156.1	298	224.9	195.5
59	44.5	38.7	119	89.8	78.1	179	135.1	117.4	239	180.4	156.8	299	225.7	196.2
60	45.3	39.4	120	90.6	78.7	180	135.8	118.1	240	181.1	157.5	300	226.4	196.8
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

H

For 49 Degrees.

TABLE II. Difference of Latitude and Departure for 42 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	45.3	40.8	121	89.9	81.0	181	134.5	121.1	241	179.1	161.3
2	01.5	01.3	62	46.1	41.5	122	90.7	81.6	182	135.3	121.8	242	179.8	161.9
3	02.2	02.0	63	46.8	42.2	123	91.4	82.3	183	136.0	122.5	243	180.6	162.6
4	03.0	02.7	64	47.6	42.8	124	92.1	83.0	184	136.7	123.1	244	181.3	163.3
5	03.7	03.3	65	48.3	43.5	125	92.9	83.6	185	137.5	123.8	245	182.1	163.9
6	04.5	04.0	66	49.0	44.2	126	93.6	84.3	186	138.2	124.5	246	182.8	164.6
7	05.2	04.7	67	49.8	44.8	127	94.4	85.0	187	139.0	125.1	247	183.6	165.3
8	05.9	05.4	68	50.5	45.5	128	95.1	85.6	188	139.7	125.8	248	184.3	165.9
9	06.7	06.0	69	51.3	46.2	129	95.9	86.3	189	140.5	126.5	249	185·0	166.6
10	07.4	06.7	70	52.0	46.8	130	96.6	87.0	190	141.2	127.1	250	185.8	167.3
11	08.2	07.4	71	52.8	47.5	131	97.4	87.7	191	141.9	127.8	251	186.5	168.0
12	08.9	08.0	72	53.5	48.2	132	98.1	88.3	192	142.7	128.5	252	187.3	168.6
13	09.7	08.7	73	54.2	48.8	133	98.8	89.0	193	143.4	129.1	253	188.0	169.3
14	10.4	09.4	74	55.0	49.5	134	99.6	89.7	194	144.2	129.8	254	188.8	170.0
15	11.1	10.0	75	55.7	50.2	135	100.3	90.3	195	144.9	130.5	255	189.5	170.6
16	11.9	10.7	76	56.5	50.9	136	101.1	91.0	196	145.7	131.1	256	190.2	171.3
17	12.6	11.4	77	57.2	51.5	137	101.8	91.7	197	146.4	131.8	257	191.0	172.0
18	13.4	12.0	78	58.0	52.2	138	102.6	92.3	198	147.1	132.5	258	191.7	172.6
19	14.1	12.7	79	58.7	52.9	139	103.3	93.0	199	147.9	133.2	259	192.5	173.3
20	14.9	13.4	80	59.5	53.5	140	104.0	93.7	200	148.6	133.8	260	193.2	174.0
21	15.6	14.1	81	60.2	54.2	141	104.8	94.3	201	149.4	134.5	261	194.0	174.6
22	16.3	14.7	82	60.9	54.9	142	105.5	95.0	202	150.1	135.2	262	194.7	175.3
23	17.1	15.4	83	61.7	55.5	143	106.3	95.7	203	150.9	135.8	263	195.4	176.0
24	17.8	16.1	84	62.4	56.2	144	107.0	96.4	204	151.6	136.5	264	196.2	176.7
25	18.6	16.7	85	63.2	56.9	145	107.8	97.0	205	152.3	137.2	265	196.9	177.3
26	19.3	17.4	86	63.9	57.5	146	108.5	97.7	206	153.1	137.8	266	197.7	178.0
27	20.1	18.1	87	64.7	58.2	147	109.2	98.4	207	153.8	138.5	267	198.4	178.7
28	20.8	18.7	88	65.4	58.9	148	110.0	99.0	208	154.6	139.2	268	199.2	179·3
29	21.6	19.4	89	66.1	59.6	149	110.7	99.7	209	155.3	139.8	269	199.9	180.0
30	22.3	20.1	90	66.9	60.2	150	111.5	100.4	210	156.1	140.5	270	200.6	180.7
31	23.0	20.7	91	67.6	60.9	151	112.2	101.0	211	156.8	141.2	271	201.4	181.3
32	23.8	21.4	92	68.4	61.6	152	113.0	101.7	212	157.5	141.9	272	202.1	182.0
33	24.5	22.1	93	69.1	62.2	153	113.7	102.4	213	158.3	142.5	273	202.9	182.7
34	25.3	22.8	94	69.9	62.9	154	114.4	103.0	214	159.0	143.2	274	203.6	183.3
35	26.0	23.4	95	70.6	63.6	155	115.2	103.7	215	159.8	143.9	275	204.4	184.0
36	26.8	24.1	96	71.3	64.2	156	115.9	104.4	216	160.5	144.5	276	205.1	184.7
37	27.5	24.8	97	72.1	64.9	157	116.7	105.1	217	161.3	145.2	277	205.9	185.3
38	28.2	25.4	98	72.8	65.6	158	117.4	105.7	218	162.0	145.9	278	206.6	186.0
39	29.0	26.1	99	73.6	66.2	159	118.2	106.4	219	162.7	146.5	279	207.3	186.7
40	29.7	26.8	100	74.3	66.9	160	118.9	107.1	220	163.5	147.2	280	208.1	187.4
41	30.5	27.4	101	75.1	67.6	161	119.6	107.7	221	164.2	147.9	281	208.8	188.0
42	31.2	28.1	102	75.8	68.3	162	120.4	103.4	222	165.0	148.5	282	209.6	188.7
43	32.0	28.8	103	76.5	68.9	163	121.1	109.1	223	165.7	149.2	283	210.3	189.4
44	32.7	29.4	104	77.3	69.6	164	121.9	109.7	224	166.5	149.9	284	211.1	190.0
45	33.4	30.1	105	78.0	70.3	165	122.6	110.4	225	167.2	150.6	285	211.8	190.7
46	34.2	30.8	106	78.8	70.9	166	123.4	111.1	226	168.0	151.2	286	212.5	191.4
47	34.9	31.4	107	79.5	71.6	167	124.1	111.7	227	168.7	151.9	287	213.3	192.0
48	35.7	32.1	108	80.3	72.3	168	124.8	112.4	228	169.4	152.6	288	214.0	192.7
49	36.4	32.8	109	81.0	72.9	169	125.6	113.1	229	170.2	153.2	289	214.8	193.4
50	37.2	33.5	110	81.7	73.6	170	126.3	113.8	230	170.9	153.9	290	215.5	194.0
51	37.9	34.1	111	82.5	74.3	171	127.1	114.4	231	171.7	154.6	291	216.3	194.7
52	38.6	34:8	112	83.2	74.9	172	127.8	115.1	232	172:4	155.2	292	217.0	195.4
53	39.4	35.5	113	84.0	75.6	173	128.6	115.8	233	173.2	155.9	293	217.7	196.1
54	40.1	36.1	114	84.7	76.3	174	129.3	116.4	234	173.9	156.6	294	218.5	196.7
55	40.9	36.8	115	85.5	77.0	175	130.1	117.1	235	174.6	157.2	295	219.2	197.4
56	41.6	37.5	116	86.2	77.6	176	130.8	117.8	236	175.4	157.9	296	220.0	198.1
57	42.4	38.1	117	86.9	78.3	177	131.5	118.4	237	176.1	158.6	297	220.7	198.7
58	43.1	38.8	118	87.7	79.0	178	132.3	119.1	238	176.9	159.3	298	221.5	199.4
59	43.8	39.5	119	88.4	79.6	179	133.0	119.8	239	177.6	159.9	299	222.2	200.1
60	44.6	40.1	120	89.2	80.3	180	133.8	120.4	240	178.4	160.6	300	222.9	200.7
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 48 Degrees.

TABLE II. Difference of Latitude and Departure for 43 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	44.6	41.6	121	88.5	82.5	181	132.4	123.4	241	176.3	164.4
2	01.5	01.4	62	45.3	42.3	122	89.2	83.2	182	133.1	124.1	242	177.0	165.0
3	02.2	02.0	63	46.1	43.0	123	90.0	83.9	183	133.8	124.8	243	177.7	165.7
4	02.9	02.7	64	46.8	43.6	124	90.7	84.6	184	134.6	125.5	244	178.5	166.4
5	03.7	03.4	65	47.5	44.3	125	91.4	85.2	185	135.3	126.2	245	179.2	167.1
6	04.4	04.1	66	48.3	45.0	126	92.2	85.9	186	136.0	126.9	246	179.9	167.8
7	05.1	04.8	67	49.0	45.7	127	92.9	86.6	187	136.8	127.5	247	180.6	168.5
8	05.9	05.5	68	49.7	46.4	128	93.6	87.3	188	137.5	128.2	248	181.4	169.1
9	06.6	06.1	69	50.5	47.1	129	94.3	88.0	189	138.2	128.9	249	182.1	169.8
10	07.3	06.8	70	51.2	47.7	130	95.1	88.7	190	139.0	129.6	250	182.8	170.5
11	08.0	07.5	71	51.9	48.4	131	95.8	89.3	191	139.7	130.3	251	183.6	171.2
12	08.8	08.2	72	52.7	49.1	132	96.5	90.0	192	140.4	130.9	252	184.3	171.9
13	09.5	08.9	73	53.4	49.8	133	97.3	90.7	193	141.2	131.6	253	185.0	172.5
14	10.2	09.5	74	54.1	50.5	134	98.0	91.4	194	141.9	132.3	254	185.8	173.2
15	11.0	10.2	75	54.9	51.1	135	98.7	92.1	195	142.6	133.0	255	186.5	173.9
16	11.7	10.9	76	55.6	51.8	136	99.5	92.8	196	143.3	133.7	256	187.2	174.6
17	12.4	11.6	77	56.3	52.5	137	100.2	93.4	197	144.1	134.4	257	188.0	175.3
18	13.2	12.3	78	57.0	53.2	138	100.9	94.1	198	144.8	135.0	258	188.7	176.0
19	13.9	13.0	79	57.8	53.9	139	101.7	94.8	199	145.5	135.7	259	189.4	176.6
20	14.6	13.6	80	58.5	54.6	140	102.4	95.5	200	146.3	136.4	260	190.2	177.3
21	15.4	14.3	81	59.2	55.2	141	103.1	96.2	201	147.0	137.1	261	190.9	178.0
22	16.1	15.0	82	60.0	55.9	142	103.9	96.8	202	147.7	137.8	262	191.6	178.7
23	16.8	15.7	83	60.7	56.6	143	104.6	97.5	203	148.5	138.4	263	192.3	179.4
24	17.6	16.4	84	61.4	57.3	144	105.3	98.2	204	149.2	139.1	264	193.1	180.0
25	18.3	17.0	85	62.2	58.0	145	106.0	98.9	205	149.9	139.8	265	193.8	180.7
26	19.0	17.7	86	62.9	58.7	146	106.8	99.6	206	150.7	140.5	266	194.5	181.4
27	19.7	18.4	87	63.6	59.3	147	107.5	100.3	207	151.4	141.2	267	195.3	182.1
28	20.5	19.1	88	64.4	60.0	148	108.2	100.9	208	152.1	141.9	268	196.0	182.8
29	21.2	19.8	89	65.1	60.7	149	109.0	101.6	209	152.9	142.5	269	196.7	183.5
30	21.9	20.5	90	65.8	61.4	150	109.7	102.3	210	153.6	143.2	270	197.5	184.1
31	22.7	21.1	91	66.6	62.1	151	110.4	103.0	211	154.3	143.9	271	198.2	184.8
32	23.4	21.8	92	67.3	62.7	152	111.2	103.7	212	155.0	144.6	272	198.9	185.5
33	24.1	22.5	93	68.0	63.4	153	111.9	104.3	213	155.8	145.3	273	199.7	186.2
34	24.9	23.2	94	68.7	64.1	154	112.6	105.0	214	156.5	145.9	274	200.4	186.9
35	25.6	23.9	95	69.5	64.8	155	113.4	105.7	215	157.2	146.6	275	201.1	187.5
36	26.3	24.6	96	70.2	65.5	156	114.1	106.4	216	158.0	147.3	276	201.9	188.2
37	27.1	25.2	97	70.9	66.2	157	114.8	107.1	217	158.7	148.0	277	202.6	188.9
38	27.8	25.9	98	71.7	66.8	158	115.6	107.8	218	159.4	148.7	278	203.3	189.6
39	28.5	26.6	99	72.4	67.5	159	116.3	108.4	219	160.2	149.4	279	204.0	190.3
40	29.3	27.3	100	73.1	68.2	160	117.0	109.1	220	160.9	150.0	280	204.8	191.0
41	30.0	28.0	101	73.9	68.9	161	117.7	109.8	221	161.6	150.7	281	205.5	191.6
42	30.7	28.6	102	74.6	69.6	162	118.5	110.5	222	162.4	151.4	282	206.2	192.3
43	31.4	29.3	103	75.3	70.2	163	119.2	111.2	223	163.1	152.1	283	207.0	193.0
44	32.2	30.0	104	76.1	70.9	164	119.9	111.8	224	163.8	152.8	284	207.7	193.7
45	32.9	30.7	105	76.8	71.6	165	120.7	112.5	225	164.6	153.4	285	208.4	194.4
46	33.6	31.4	106	77.5	72.3	166	121.4	113.2	226	165.3	154.1	286	209.2	195.1
47	34.4	32.1	107	78.3	73.0	167	122.1	113.9	227	166.0	154.8	287	209.9	195.7
48	35.1	32.7	108	79.0	73.7	168	122.9	114.6	228	166.7	155.5	288	210.6	196.4
49	35.8	33.4	109	79.7	74.3	169	123.6	115.3	229	167.5	156.2	289	211.4	197.1
50	36.6	34.1	110	80.4	75.0	170	124.3	115.9	230	168.2	156.9	290	212.1	197.8
51	37.3	34.8	111	81.2	75.7	171	125.1	116.6	231	168.9	157.5	291	212.8	198.5
52	38.0	35.5	112	81.9	76.4	172	125.8	117.3	232	169.7	158.2	292	213.6	199.1
53	38.8	36.1	113	82.6	77.1	173	126.5	118.0	233	170.4	158.9	293	214.3	199.8
54	39.5	36.8	114	83.4	77.7	174	127.3	118.7	234	171.1	159.6	294	215.0	200.5
55	40.2	37.5	115	84.1	78.4	175	128.0	119.3	235	171.9	160.3	295	215.7	201.2
56	41.0	38.2	116	84.8	79.1	176	128.7	120.0	236	172.6	161.0	296	216.5	201.9
57	41.7	38.9	117	85.6	79.8	177	129.4	120.7	237	173.3	161.6	297	217.2	202.6
58	42.4	39.6	118	86.3	80.5	178	130.2	121.4	238	174.1	162.3	298	217.9	203.2
59	43.1	40.2	119	87.0	81.2	179	130.9	122.1	239	174.8	163.0	299	218.7	203.9
60	43.9	40.9	120	87.8	81.8	180	131.6	122.8	240	175.5	163.7	300	219.4	204.6
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 47 Degrees.

TABLE II. Difference of Latitude and Departure for 44 Degrees.

Dist	Lat.	Dep	Dist	Lat	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	43.9	42.4	121	87.0	84.1	181	130.2	125.7	241	173.4	167.4
2	01.4	01.4	62	44.6	43.1	122	87.8	84.7	182	130.9	126.4	242	174.1	168.1
3	02.2	02.1	63	45.3	43.8	123	88.5	85.4	183	131.6	127.1	243	174.8	168.8
4	02.9	02.8	64	46.0	44.5	124	89.2	86.1	184	132.4	127.8	244	175.5	169.5
5	03.6	03.5	65	46.8	45.2	125	89.9	86.8	185	133.1	128.5	245	176.2	170.2
6	04.3	04.2	66	47.5	45.8	126	90.6	87.5	186	133.8	129.2	246	177.0	170.9
7	05.0	04.9	67	48.2	46.5	127	91.4	88.2	187	134.5	129.9	247	177.7	171.6
8	05.8	05.6	68	48.9	47.2	128	92.1	88.9	188	135.2	130.6	248	178.4	172.3
9	06.5	06.3	69	49.6	47.9	129	92.8	89.6	189	136.0	131.3	249	179.1	173.0
10	07.2	06.9	70	50.4	48.6	130	93.5	90.3	190	136.7	132.0	250	179.8	173.7
11	07.9	07.6	71	51.1	49.3	131	94.2	91.0	191	137.4	132.7	251	180.6	174.4
12	08.6	08.3	72	51.8	50.0	132	95.0	91.7	192	138.1	133.4	252	181.3	175.1
13	09.4	09.0	73	52.5	50.7	133	95.7	92.4	193	138.8	134.1	253	182.0	175.7
14	10.1	09.7	74	53.2	51.4	134	96.4	93.1	194	139.6	134.8	254	182.7	176.4
15	10.8	10.4	75	54.0	52.1	135	97.1	93.8	195	140.3	135.5	255	183.4	177.1
16	11.5	11.1	76	54.7	52.8	136	97.8	94.5	196	141.0	136.2	256	184.2	177.8
17	12.2	11.8	77	55.4	53.5	137	98.5	95.2	197	141.7	136.8	257	184.9	178.5
18	12.9	12.5	78	56.1	54.2	138	99.3	95.9	198	142.4	137.5	258	185.6	179.2
19	13.7	13.2	79	56.8	54.9	139	100.0	96.6	199	143.1	138.2	259	186.3	179.9
20	14.4	13.9	80	57.5	55.6	140	100.7	97.3	200	143.9	138.9	260	187.0	180.6
21	15.1	14.6	81	58.3	56.3	141	101.4	97.9	201	144.6	139.6	261	187.7	181.3
22	15.8	15.3	82	59.0	57.0	142	102.1	98.6	202	145.3	140.3	262	188.5	182.0
23	16.5	16.0	83	59.7	57.7	143	102.9	99.3	203	146.0	141.0	263	189.2	182.7
24	17.3	16.7	84	60.4	58.4	144	103.6	100.0	204	146.7	141.7	264	189.9	183.4
25	18.0	17.4	85	61.1	59.0	145	104.3	100.7	205	147.5	142.4	265	190.6	184.1
26	18.7	18.1	86	61.9	59.7	146	105.0	101.4	206	148.2	143.1	266	191.3	184.8
27	19.4	18.8	87	62.6	60.4	147	105.7	102.1	207	148.9	143.8	267	192.1	185.5
28	20.1	19.5	88	63.3	61.1	148	106.5	102.8	208	149.6	144.5	268	192.8	186.2
29	20.9	20.1	89	64.0	61.8	149	107.2	103.5	209	150.3	145.2	269	193.5	186.9
30	21.6	20.8	90	64.7	62.5	150	107.9	104.2	210	151.1	145.9	270	194.2	187.6
31	22.3	21.5	91	65.5	63.2	151	108.6	104.9	211	151.8	146.6	271	194.9	188.3
32	23.0	22.2	92	66.2	63.9	152	109.3	105.6	212	152.5	147.3	272	195.7	188.9
33	23.7	22.9	93	66.9	64.6	153	110.1	106.3	213	153.2	148.0	273	196.4	189.6
34	24.5	23.6	94	67.6	65.3	154	110.8	107.0	214	153.9	148.7	274	197.1	190.3
35	25.2	24.3	95	68.3	66.0	155	111.5	107.7	215	154.7	149.4	275	197.8	191.0
36	25.9	25.0	96	69.1	66.7	156	112.2	108.4	216	155.4	150.0	276	198.5	191.7
37	26.6	25.7	97	69.8	67.4	157	112.9	109.1	217	156.1	150.7	277	199.3	192.4
38	27.3	26.4	98	70.5	68.1	158	113.7	109.8	218	156.8	151.4	278	200.0	193.1
39	28.1	27.1	99	71.2	68.8	159	114.4	110.5	219	157.5	152.1	279	200.7	193.8
40	28.8	27.8	100	71.9	69.5	160	115.1	111.1	220	158.3	152.8	280	201.4	194.5
41	29.5	28.5	101	72.7	70.2	161	115.8	111.8	221	159.0	153.5	281	202.1	195.2
42	30.2	29.2	102	73.4	70.9	162	116.5	112.5	222	159.7	154.2	282	202.9	195.9
43	30.9	29.9	103	74.1	71.5	163	117.3	113.2	223	160.4	154.9	283	203.6	196.6
44	31.7	30.6	104	74.8	72.2	164	118.0	113.9	224	161.1	155.6	284	204.3	197.3
45	32.4	31.3	105	75.5	72.9	165	118.7	114.6	225	161.9	156.3	285	205.0	198.0
46	33.1	32.0	106	76.3	73.6	166	119.4	115.3	226	162.6	157.0	286	205.7	198.7
47	33.8	32.6	107	77.0	74.3	167	120.1	116.0	227	163.3	157.7	287	206.5	199.4
48	34.5	33.3	108	77.7	75.0	168	120.8	116.7	228	164.0	158.4	288	207.2	200.1
49	35.2	34.0	109	78.4	75.7	169	121.6	117.4	229	164.7	159.1	289	207.9	200.8
50	36.0	34.7	110	79.1	76.4	170	122.3	118.1	230	165.4	159.8	290	208.6	201.5
51	36.7	35.4	111	79.8	77.1	171	123.0	118.8	231	166.2	160.5	291	209.3	202.1
52	37.4	36.1	112	80.6	77.8	172	123.7	119.5	232	166.9	161.2	292	210.0	202.8
53	38.1	36.8	113	81.3	78.5	173	124.4	120.2	233	167.6	161.9	293	210.8	203.5
54	38.8	37.5	114	82.0	79.2	174	125.2	120.9	234	168.3	162.6	294	211.5	204.2
55	39.6	38.2	115	82.7	79.9	175	125.9	121.6	235	169.0	163.2	295	212.2	204.9
56	40.3	38.9	116	83.4	80.6	176	126.6	122.3	236	169.8	163.9	296	212.9	205.6
57	41.0	39.6	117	84.2	81.3	177	127.3	123.0	237	170.5	164.6	297	213.6	206.3
58	41.7	40.3	118	84.9	82.0	178	128.0	123.6	238	171.2	165.3	298	214.4	207.0
59	42.4	41.0	119	85.6	82.7	179	128.8	124.3	239	171.9	166.0	299	215.1	207.7
60	43.2	41.7	120	86.3	83.4	180	129.5	125.0	240	172.6	166.7	300	215.8	208.4
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat

For 46 Degrees.

TABLE II. Difference of Latitude and Departure for 45 Degrees.

Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep	Dist	Lat.	Dep
1	00.7	00.7	61	43.1	43.1	121	85.6	85.6	181	128.0	128.0	241	170.4	170.4
2	01.4	01.4	62	43.8	43.8	122	86.3	86.3	182	128.7	128.7	242	171.1	171.1
3	02.1	02.1	63	44.5	44.5	123	87.0	87.0	183	129.4	129.4	243	171.8	171.8
4	02.8	02.8	64	45.3	45.3	124	87.7	87.7	184	130.1	130.1	244	172.5	172.5
5	03.5	03.5	65	46.0	46.0	125	88.4	88.4	185	130.8	130.8	245	173.2	173.2
6	04.2	04.2	66	46.7	46.7	126	89.1	89.1	186	131.5	131.5	246	173.9	173.9
7	04.9	04.9	67	47.4	47.4	127	89.8	89.8	187	132.2	132.2	247	174.7	174.7
8	05.7	05.7	68	48.1	48.1	128	90.5	90.5	188	132.9	132.9	248	175.4	175.4
9	06.4	06.4	69	48.8	48.8	129	91.2	91.2	189	133.6	133.6	249	176.1	176.1
10	07.1	07.1	70	49.5	49.5	130	91.9	91.9	190	134.4	134.4	250	176.8	176.8
11	07.8	07.8	71	50.2	50.2	131	92.6	92.6	191	135.1	135.1	251	177.5	177.5
12	08.5	08.5	72	50.9	50.9	132	93.3	93.3	192	135.8	135.8	252	178.2	178.2
13	09.2	09.2	73	51.6	51.6	133	94.0	94.0	193	136.5	136.5	253	178.9	178.9
14	09.9	09.9	74	52.3	52.3	134	94.8	94.8	194	137.2	137.2	254	179.6	179.6
15	10.6	10.6	75	53.0	53.0	135	95.5	95.5	195	137.9	137.9	255	180.3	180.3
16	11.3	11.3	76	53.7	53.7	136	96.2	96.2	196	138.6	138.6	256	181.0	181.0
17	12.0	12.0	77	54.4	54.4	137	96.9	96.9	197	139.3	139.3	257	181.7	181.7
18	12.7	12.7	78	55.2	55.2	138	97.6	97.6	198	140.0	140.0	258	182.4	182.4
19	13.4	13.4	79	55.9	55.9	139	98.3	98.3	199	140.7	140.7	259	183.1	183.1
20	14.1	14.1	80	56.6	56.6	140	99.0	99.0	200	141.4	141.4	260	183.8	183.8
21	14.8	14.8	81	57.3	57.3	141	99.7	99.7	201	142.1	142.1	261	184.6	184.6
22	15.6	15.6	82	58.0	58.0	142	100.4	100.4	202	142.8	142.8	262	185.3	185.3
23	16.3	16.3	83	58.7	58.7	143	101.1	101.1	203	143.5	143.5	263	186.0	186.0
24	17.0	17.0	84	59.4	59.4	144	101.8	101.8	204	144.2	144.2	264	186.7	186.7
25	17.7	17.7	85	60.1	60.1	145	102.5	102.5	205	145.0	145.0	265	187.4	187.4
26	18.4	18.4	86	60.8	60.8	146	103.2	103.2	206	145.7	145.7	266	188.1	188.1
27	19.1	19.1	87	61.5	61.5	147	103.9	103.9	207	146.4	146.4	267	188.8	188.8
28	19.8	19.8	88	62.2	62.2	148	104.7	104.7	208	147.1	147.1	268	189.5	189.5
29	20.5	20.5	89	62.9	62.9	149	105.4	105.4	209	147.8	147.8	269	190.2	190.2
30	21.2	21.2	90	63.6	63.6	150	106.1	106.1	210	148.5	148.5	270	190.9	190.9
31	21.9	21.9	91	64.3	64.3	151	106.8	106.8	211	149.2	149.2	271	191.6	191.6
32	22.6	22.6	92	65.1	65.1	152	107.5	107.5	212	149.9	149.9	272	192.3	192.3
33	23.3	23.3	93	65.8	65.8	153	108.2	108.2	213	150.6	150.6	273	193.0	193.0
34	24.0	24.0	94	66.5	66.5	154	108.9	108.9	214	151.3	151.3	274	193.7	193.7
35	24.7	24.7	95	67.2	67.2	155	109.6	109.6	215	152.0	152.0	275	194.5	194.5
36	25.5	25.5	96	67.9	67.9	156	110.3	110.3	216	152.7	152.7	276	195.2	195.2
37	26.2	26.2	97	68.6	68.6	157	111.0	111.0	217	153.4	153.4	277	195.9	195.9
38	26.9	26.9	98	69.3	69.3	158	111.7	111.7	218	154.1	154.1	278	196.6	196.6
39	27.6	27.6	99	70.0	70.0	159	112.4	112.4	219	154.9	154.9	279	197.3	197.3
40	28.3	28.3	100	70.7	70.7	160	113.1	113.1	220	155.6	155.6	280	198.0	198.0
41	29.0	29.0	101	71.4	71.4	161	113.8	113.8	221	156.3	156.3	281	198.7	198.7
42	29.7	29.7	102	72.1	72.1	162	114.6	114.6	222	157.0	157.0	282	199.4	199.4
43	30.4	30.4	103	72.8	72.8	163	115.3	115.3	223	157.7	157.7	283	200.1	200.1
44	31.1	31.1	104	73.5	73.5	164	116.0	116.0	224	158.4	158.4	284	200.8	200.8
45	31.8	31.8	105	74.2	74.2	165	116.7	116.7	225	159.1	159.1	285	201.5	201.5
46	32.5	32.5	106	75.0	75.0	166	117.4	117.4	226	159.8	159.8	286	202.2	202.2
47	33.2	33.2	107	75.7	75.7	167	118.1	118.1	227	160.5	160.5	287	202.9	202.9
48	33.9	33.9	108	76.4	76.4	168	118.8	118.8	228	161.2	161.2	288	203.6	203.6
49	34.6	34.6	109	77.1	77.1	169	119.5	119.5	229	161.9	161.9	289	204.4	204.4
50	35.4	35.4	110	77.8	77.8	170	120.2	120.2	230	162.6	162.6	290	205.1	205.1
51	36.1	36.1	111	78.5	78.5	171	120.9	120.9	231	163.3	163.3	291	205.8	205.8
52	36.8	36.8	112	79.2	79.2	172	121.6	121.6	232	164.0	164.0	292	206.5	206.5
53	37.5	37.5	113	79.9	79.9	173	122.3	122.3	233	164.8	164.8	293	207.2	207.2
54	38.2	38.2	114	80.6	80.6	174	123.0	123.0	234	165.5	165.5	294	207.9	207.9
55	38.9	38.9	115	81.3	81.3	175	123.7	123.7	235	166.2	166.2	295	208.6	208.6
56	39.6	39.6	116	82.0	82.0	176	124.5	124.5	236	166.9	166.9	296	209.3	209.3
57	40.3	40.3	117	82.7	82.7	177	125.2	125.2	237	167.6	167.6	297	210.0	210.0
58	41.0	41.0	118	83.4	83.4	178	125.9	125.9	238	168.3	168.3	298	210.7	210.7
59	41.7	41.7	119	84.1	84.1	179	126.6	126.6	239	169.0	169.0	299	211.4	211.4
60	42.4	42.4	120	84.9	84.9	180	127.3	127.3	240	169.7	169.7	300	212.1	212.1
Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.	Dist	Dep	Lat.

For 45 Degrees.

TABLE III. MERIDIONAL PARTS.

M	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	M
0	0	60	120	180	240	300	361	421	482	542	603	664	725	787	848	910	0
1	1	61	121	181	241	301	362	422	483	543	604	665	726	788	850	911	1
2	2	62	122	182	242	302	363	423	484	544	605	666	727	789	851	913	2
3	3	63	123	183	243	303	364	424	485	545	606	667	728	790	852	914	3
4	4	64	124	184	244	304	365	425	486	546	607	668	729	791	853	915	4
5	5	65	125	185	245	305	366	426	487	547	608	669	730	792	854	916	5
6	6	66	126	186	246	306	367	427	488	548	609	670	731	793	855	917	6
7	7	67	127	187	247	307	368	428	439	549	610	671	732	794	856	918	7
8	8	68	128	188	248	308	369	429	490	550	611	672	734	795	857	919	8
9	9	69	129	189	249	309	370	430	491	551	612	673	735	796	858	920	9
10	10	70	130	190	250	310	371	431	492	552	613	674	736	797	859	921	10
11	11	71	131	191	251	311	372	432	493	553	614	675	737	798	860	922	11
12	12	72	132	192	252	312	373	433	494	554	615	676	738	799	861	923	12
13	13	73	133	193	253	313	374	434	495	555	616	677	739	800	862	924	13
14	14	74	134	194	254	314	375	435	496	556	617	678	740	801	863	925	14
15	15	75	135	195	255	315	376	436	497	557	618	679	741	802	864	926	15
16	16	76	136	196	256	316	377	437	498	558	619	680	742	803	865	927	16
17	17	77	137	197	257	317	378	438	499	559	620	681	743	804	866	928	17
18	18	78	138	198	258	318	379	439	500	560	621	682	744	805	867	929	18
19	19	79	139	199	259	319	380	440	501	561	622	683	745	806	868	930	19
20	20	80	140	200	260	320	381	441	502	562	623	684	746	807	869	931	20
21	21	81	141	201	261	321	382	442	503	564	624	685	747	808	870	932	21
22	22	82	142	202	262	322	383	443	504	565	625	687	748	809	871	933	22
23	23	83	143	203	263	323	384	444	505	566	626	688	749	810	872	934	23
24	24	84	144	204	264	324	385	445	506	567	627	689	750	811	873	935	24
25	25	85	145	205	265	325	386	446	507	568	628	690	751	812	874	936	25
26	26	86	146	206	266	326	387	447	508	569	629	691	752	813	875	937	26
27	27	87	147	207	267	327	388	448	509	570	631	692	753	815	876	938	27
28	28	88	148	208	268	328	389	449	510	571	632	693	754	816	877	939	28
29	29	89	149	209	269	330	390	450	511	572	633	694	755	817	878	941	29
30	30	90	150	210	270	331	391	451	512	573	634	695	756	818	879	942	30
31	31	91	151	211	271	332	392	452	513	574	635	696	757	819	880	943	31
32	32	92	152	212	272	333	393	453	514	575	636	697	758	820	882	944	32
33	33	93	153	213	273	334	394	454	515	576	637	698	759	821	883	945	33
34	34	94	154	214	274	335	395	455	516	577	638	699	760	822	884	946	34
35	35	95	155	215	275	336	396	456	517	578	639	700	761	823	885	947	35
36	36	96	156	216	276	337	397	457	518	579	640	701	762	824	886	948	36
37	37	97	157	217	277	338	398	458	519	580	641	702	763	825	887	949	37
38	38	98	158	218	278	339	399	459	520	581	642	703	764	826	888	950	38
39	39	99	159	219	279	340	400	460	521	582	643	704	765	827	889	951	39
40	40	100	160	220	280	341	401	461	522	583	644	705	766	828	890	952	40
41	41	101	161	221	281	342	402	462	523	584	645	706	767	829	891	953	41
42	42	102	162	222	282	343	403	463	524	585	646	707	768	830	892	954	42
43	43	103	163	223	283	344	404	464	525	586	647	708	769	831	893	955	43
44	44	104	164	224	284	345	405	465	526	587	648	709	770	832	894	956	44
45	45	105	165	225	285	346	406	466	527	588	649	710	771	833	895	957	45
46	46	106	166	226	286	347	407	467	528	589	650	711	772	834	896	958	46
47	47	107	167	227	287	348	408	468	529	590	651	712	773	835	897	959	47
48	48	108	168	228	288	349	409	469	530	591	652	713	774	836	898	960	48
49	49	109	169	229	289	350	410	470	531	592	653	714	775	837	899	961	49
50	50	110	170	230	290	351	411	471	532	593	654	715	777	838	900	962	50
51	51	111	171	231	291	352	412	472	533	594	655	716	778	839	901	963	51
52	52	112	172	232	292	353	413	473	534	595	656	717	779	840	902	964	52
53	53	113	173	233	293	354	414	474	535	596	657	718	780	841	903	965	53
54	54	114	174	234	294	355	415	476	536	597	658	719	781	842	904	966	54
55	55	115	175	235	295	356	416	477	537	598	659	720	782	843	905	968	55
56	56	116	176	236	296	357	417	478	538	599	660	721	783	844	906	969	56
57	57	117	177	237	297	358	418	479	539	600	661	722	784	845	907	970	57
58	58	118	178	238	298	359	419	480	540	601	662	723	785	846	908	971	58
59	59	119	179	239	299	360	420	481	541	602	663	724	786	847	909	972	59
M	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	M

TABLE III. MERIDIONAL PARTS.

M	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	M
0	973	1035	1098	1161	1225	1289	1354	1419	1484	1550	1616	1684	1751	0
1	974	1036	1099	1163	1226	1290	1355	1420	1485	1551	1618	1685	1752	1
2	975	1037	1100	1164	1227	1291	1356	1421	1486	1552	1619	1686	1753	2
3	976	1038	1101	1165	1228	1292	1357	1422	1487	1553	1620	1687	1755	3
4	977	1039	1102	1166	1229	1293	1358	1423	1488	1554	1621	1688	1756	4
5	978	1041	1103	1167	1230	1295	1359	1424	1490	1556	1622	1689	1757	5
6	979	1042	1105	1168	1232	1296	1360	1425	1491	1557	1623	1690	1758	6
7	980	1043	1106	1169	1233	1297	1361	1426	1492	1558	1624	1691	1759	7
8	981	1044	1107	1170	1234	1298	1362	1427	1493	1559	1625	1693	1760	8
9	982	1045	1108	1171	1235	1299	1363	1428	1494	1560	1626	1694	1761	9
10	983	1046	1109	1172	1236	1300	1364	1430	1495	1561	1628	1695	1762	10
11	984	1047	1110	1173	1237	1301	1366	1431	1496	1562	1629	1696	1764	11
12	985	1048	1111	1174	1238	1302	1367	1432	1497	1563	1630	1697	1765	12
13	986	1049	1112	1175	1239	1303	1368	1433	1498	1564	1631	1698	1766	13
14	987	1050	1113	1176	1240	1304	1369	1434	1499	1565	1632	1699	1767	14
15	988	1051	1114	1177	1241	1305	1370	1435	1500	1567	1633	1700	1768	15
16	989	1052	1115	1178	1242	1306	1371	1436	1502	1568	1634	1701	1769	16
17	990	1053	1116	1179	1243	1307	1372	1437	1503	1569	1635	1703	1770	17
18	991	1054	1117	1181	1244	1308	1373	1438	1504	1570	1637	1704	1772	18
19	993	1055	1118	1182	1245	1310	1374	1439	1505	1571	1638	1705	1773	19
20	994	1056	1119	1183	1246	1311	1375	1440	1506	1572	1639	1706	1774	20
21	995	1057	1120	1184	1248	1312	1376	1441	1507	1573	1640	1707	1775	21
22	996	1058	1121	1185	1249	1313	1377	1443	1508	1574	1641	1708	1776	22
23	997	1059	1122	1186	1250	1314	1379	1444	1509	1575	1642	1709	1777	23
24	998	1060	1123	1187	1251	1315	1380	1445	1510	1577	1643	1711	1778	24
25	999	1061	1125	1188	1252	1316	1381	1446	1511	1578	1644	1712	1780	25
26	1000	1063	1126	1189	1253	1317	1382	1447	1513	1579	1645	1713	1781	26
27	1001	1064	1127	1190	1254	1318	1383	1448	1514	1580	1647	1714	1782	27
28	1002	1065	1128	1191	1255	1319	1384	1449	1515	1581	1648	1715	1783	28
29	1003	1066	1129	1192	1256	1320	1385	1450	1516	1582	1649	1716	1784	29
30	1004	1067	1130	1193	1257	1321	1386	1451	1517	1583	1650	1717	1785	30
31	1005	1068	1131	1194	1258	1322	1387	1452	1518	1584	1651	1718	1786	31
32	1006	1069	1132	1195	1259	1324	1388	1453	1519	1585	1652	1720	1787	32
33	1007	1070	1133	1196	1260	1325	1389	1455	1520	1586	1653	1721	1789	33
34	1008	1071	1134	1198	1261	1326	1390	1456	1521	1588	1654	1722	1790	34
35	1009	1072	1135	1199	1262	1327	1392	1457	1522	1589	1656	1723	1791	35
36	1010	1073	1136	1200	1264	1328	1393	1458	1524	1590	1657	1724	1792	36
37	1011	1074	1137	1201	1265	1329	1394	1459	1525	1591	1658	1725	1793	37
38	1012	1075	1138	1202	1266	1330	1395	1460	1526	1592	1659	1726	1794	38
39	1013	1076	1139	1203	1267	1331	1396	1461	1527	1593	1660	1727	1795	39
40	1014	1077	1140	1204	1268	1332	1397	1462	1528	1594	1661	1729	1797	40
41	1015	1078	1141	1205	1269	1333	1398	1463	1529	1595	1662	1730	1798	41
42	1016	1079	1142	1206	1270	1334	1399	1464	1530	1596	1663	1731	1799	42
43	1018	1080	1144	1207	1271	1335	1400	1465	1531	1598	1664	1732	1800	43
44	1019	1081	1145	1208	1272	1336	1401	1467	1532	1599	1666	1733	1801	44
45	1020	1082	1146	1209	1273	1338	1402	1468	1533	1600	1667	1734	1802	45
46	1021	1084	1147	1210	1274	1339	1403	1469	1535	1601	1668	1735	1803	46
47	1022	1085	1148	1211	1275	1340	1405	1470	1536	1602	1669	1736	1805	47
48	1023	1086	1149	1212	1276	1341	1406	1471	1537	1603	1670	1738	1806	48
49	1024	1087	1150	1213	1277	1342	1407	1472	1538	1604	1671	1739	1807	49
50	1025	1088	1151	1215	1278	1343	1408	1473	1539	1605	1672	1740	1808	50
51	1026	1089	1152	1216	1280	1344	1409	1474	1540	1606	1673	1741	1809	51
52	1027	1090	1153	1217	1281	1345	1410	1475	1541	1608	1675	1742	1810	52
53	1028	1091	1154	1218	1282	1346	1411	1476	1542	1609	1676	1743	1811	53
54	1029	1092	1155	1219	1283	1347	1412	1477	1543	1610	1677	1744	1813	54
55	1030	1093	1156	1220	1284	1348	1413	1479	1544	1611	1678	1746	1814	55
56	1031	1094	1157	1221	1285	1349	1414	1480	1546	1612	1679	1747	1815	56
57	1032	1095	1158	1222	1286	1350	1415	1481	1547	1613	1680	1748	1816	57
58	1033	1096	1159	1223	1287	1352	1416	1482	1548	1614	1681	1749	1817	58
59	1034	1097	1160	1224	1288	1353	1418	1483	1549	1615	1682	1750	1818	59
M	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	M

TABLE III. MERIDIONAL PARTS.

M	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	M
0	1819	1888	1958	2028	2100	2171	2244	2318	2393	2468	2545	2623	2702	0
1	1821	1890	1959	2030	2101	2173	2246	2319	2394	2470	2546	2624	2703	1
2	1822	1891	1960	2031	2102	2174	2247	2320	2395	2471	2548	2625	2704	2
3	1823	1892	1962	2032	2103	2175	2248	2322	2396	2472	2549	2627	2706	3
4	1824	1893	1963	2033	2104	2176	2249	2323	2398	2473	2550	2628	2707	4
5	1825	1894	1964	2034	2105	2178	2250	2324	2399	2475	2551	2629	2708	5
6	1826	1895	1965	2035	2107	2179	2252	2325	2400	2476	2553	2631	2710	6
7	1827	1896	1966	2037	2108	2180	2253	2327	2401	2477	2554	2632	2711	7
8	1829	1898	1967	2038	2109	2181	2254	2328	2403	2478	2555	2633	2712	8
9	1830	1899	1969	2039	2110	2182	2255	2329	2404	2480	2557	2634	2714	9
10	1831	1900	1970	2040	2111	2184	2257	2330	2405	2481	2558	2636	2715	10
11	1832	1901	1971	2041	2113	2185	2258	2332	2406	2482	2559	2637	2716	11
12	1833	1902	1972	2043	2114	2186	2259	2333	2408	2484	2560	2638	2718	12
13	1834	1903	1973	2044	2115	2187	2260	2334	2409	2485	2562	2640	2719	13
14	1835	1905	1974	2045	2116	2188	2261	2335	2410	2486	2563	2641	2720	14
15	1837	1906	1976	2046	2117	2190	2263	2337	2411	2487	2564	2642	2722	15
16	1838	1907	1977	2047	2119	2191	2264	2338	2413	2489	2566	2644	2723	16
17	1839	1908	1978	2048	2120	2192	2265	2339	2414	2490	2567	2645	2724	17
18	1840	1909	1979	2050	2121	2193	2266	2340	2415	2491	2568	2646	2726	18
19	1841	1910	1980	2051	2122	2194	2268	2342	2416	2492	2569	2648	2727	19
20	1842	1912	1981	2052	2123	2196	2269	2343	2418	2494	2571	2649	2728	20
21	1843	1913	1983	2053	2125	2197	2270	2344	2419	2495	2572	2650	2729	21
22	1845	1914	1984	2054	2126	2198	2271	2345	2420	2496	2573	2651	2731	22
23	1846	1915	1985	2056	2127	2199	2272	2346	2422	2498	2575	2653	2732	23
24	1847	1916	1986	2057	2128	2200	2274	2348	2423	2499	2576	2654	2733	24
25	1848	1917	1987	2058	2129	2202	2275	2349	2424	2500	2577	2655	2735	25
26	1849	1918	1988	2059	2131	2203	2276	2350	2425	2501	2578	2657	2736	26
27	1850	1920	1990	2060	2132	2204	2277	2351	2427	2503	2580	2658	2737	27
28	1852	1921	1991	2061	2133	2205	2279	2353	2428	2504	2581	2659	2739	28
29	1853	1922	1992	2063	2134	2207	2280	2354	2429	2505	2582	2661	2740	29
30	1854	1923	1993	2064	2135	2208	2281	2355	2430	2506	2584	2662	2742	30
31	1855	1924	1994	2065	2137	2209	2282	2356	2432	2508	2585	2663	2743	31
32	1856	1925	1995	2066	2138	2210	2283	2358	2433	2509	2586	2665	2744	32
33	1857	1927	1997	2067	2139	2211	2285	2359	2434	2510	2588	2666	2746	33
34	1858	1928	1998	2069	2140	2213	2286	2360	2435	2512	2589	2667	2747	34
35	1860	1929	1999	2070	2141	2214	2287	2361	2437	2513	2590	2669	2748	35
36	1861	1930	2000	2071	2143	2215	2288	2363	2438	2514	2591	2670	2750	36
37	1862	1931	2001	2072	2144	2216	2290	2364	2439	2515	2593	2671	2751	37
38	1863	1932	2002	2073	2145	2217	2291	2365	2440	2517	2594	2673	2752	38
39	1864	1934	2004	2075	2146	2219	2292	2366	2442	2518	2595	2674	2754	39
40	1865	1935	2005	2076	2147	2220	2293	2368	2443	2519	2597	2675	2755	40
41	1866	1936	2006	2077	2149	2221	2295	2369	2444	2521	2598	2676	2756	41
42	1868	1937	2007	2078	2150	2222	2296	2370	2445	2522	2599	2678	2758	42
43	1869	1938	2008	2079	2151	2224	2297	2371	2447	2523	2601	2679	2759	43
44	1870	1939	2010	2080	2152	2225	2298	2373	2448	2524	2602	2680	2760	44
45	1871	1941	2011	2082	2153	2226	2299	2374	2449	2526	2603	2682	2762	45
46	1872	1942	2012	2083	2155	2227	2301	2375	2451	2527	2604	2683	2763	46
47	1873	1943	2013	2084	2156	2228	2302	2376	2452	2528	2606	2684	2764	47
48	1875	1944	2014	2085	2157	2230	2303	2378	2453	2530	2607	2686	2766	48
49	1876	1945	2015	2086	2158	2231	2304	2379	2454	2531	2608	2687	2767	49
50	1877	1946	2017	2088	2159	2232	2306	2380	2456	2532	2610	2688	2768	50
51	1878	1948	2018	2089	2161	2233	2307	2381	2457	2533	2611	2690	2770	51
52	1879	1949	2019	2090	2162	2235	2308	2383	2458	2535	2612	2691	2771	52
53	1880	1950	2020	2091	2163	2236	2309	2384	2459	2536	2614	2692	2772	53
54	1881	1951	2021	2092	2164	2237	2311	2385	2461	2537	2615	2694	2774	54
55	1883	1952	2022	2094	2165	2238	2312	2386	2462	2538	2616	2695	2775	55
56	1884	1953	2024	2095	2167	2239	2313	2388	2463	2540	2617	2696	2776	56
57	1885	1955	2025	2096	2168	2241	2314	2389	2464	2541	2619	2698	2778	57
58	1886	1956	2026	2097	2169	2242	2316	2390	2466	2542	2620	2699	2779	58
59	1887	1957	2027	2098	2170	2243	2317	2391	2467	2544	2621	2700	2780	59
M	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°	41°	M

TABLE III. MERIDIONAL PARTS.

M	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	M
0	2782	2863	2946	3030	3116	3203	3292	3382	3474	3569	3665	3764	3865	0
1	2783	2864	2947	3031	3117	3204	3293	3384	3476	3570	3667	3765	3866	1
2	2784	2866	2949	3033	3118	3206	3295	3385	3478	3572	3668	3767	3868	2
3	2786	2867	2950	3034	3120	3207	3296	3387	3479	3574	3670	3769	3870	3
4	2787	2869	2951	3036	3121	3209	3298	3388	3481	3575	3672	3770	3871	4
5	2788	2870	2953	3037	3123	3210	3299	3390	3482	3577	3673	3772	3873	5
6	2790	2871	2954	3038	3124	3212	3301	3391	3484	3578	3675	3774	3875	6
7	2791	2873	2956	3040	3126	3213	3302	3393	3485	3580	3677	3775	3877	7
8	2792	2874	2957	3041	3127	3214	3303	3394	3487	3582	3678	3777	3878	8
9	2794	2875	2958	3043	3129	3216	3305	3396	3488	3583	3680	3779	3880	9
10	2795	2877	2960	3044	3130	3217	3306	3397	3490	3585	3681	3780	3882	10
11	2797	2878	2961	3046	3131	3219	3308	3399	3492	3586	3683	3782	3883	11
12	2798	2880	2963	3047	3133	3220	3309	3400	3493	3588	3685	3784	3885	12
13	2799	2881	2964	3048	3134	3222	3311	3402	3495	3590	3686	3785	3887	13
14	2801	2882	2965	3050	3136	3223	3312	3403	3496	3591	3688	3787	3889	14
15	2802	2884	2967	3051	3137	3225	3314	3405	3498	3593	3690	3789	3890	15
16	2803	2885	2968	3053	3139	3226	3316	3407	3499	3594	3691	3790	3892	16
17	2805	2886	2970	3054	3140	3228	3317	3408	3501	3596	3693	3792	3894	17
18	2806	2888	2971	3055	3142	3229	3319	3410	3503	3598	3695	3794	3895	18
19	2807	2889	2972	3057	3143	3231	3320	3411	3504	3599	3696	3795	3897	19
20	2809	2891	2974	3058	3144	3232	3322	3413	3506	3601	3698	3797	3899	20
21	2810	2892	2975	3060	3146	3234	3323	3414	3507	3602	3699	3799	3901	21
22	2811	2893	2976	3061	3147	3235	3325	3416	3509	3604	3701	3800	3902	22
23	2813	2895	2978	3063	3149	3237	3326	3417	3510	3606	3703	3802	3904	23
24	2814	2896	2979	3064	3150	3238	3328	3419	3512	3607	3704	3804	3906	24
25	2815	2897	2981	3065	3152	3240	3329	3420	3514	3609	3706	3806	3907	25
26	2817	2899	2982	3067	3153	3241	3331	3422	3515	3610	3708	3807	3909	26
27	2818	2900	2983	3068	3155	3242	3332	3423	3517	3612	3709	3809	3911	27
28	2820	2902	2985	3070	3156	3244	3334	3425	3518	3614	3711	3811	3913	28
29	2821	2903	2986	3071	3157	3245	3335	3427	3520	3615	3713	3812	3914	29
30	2822	2904	2988	3073	3159	3247	3337	3428	3521	3617	3714	3814	3916	30
31	2824	2906	2989	3074	3160	3248	3338	3430	3523	3618	3716	3816	3918	31
32	2825	2907	2991	3075	3162	3250	3340	3431	3525	3620	3717	3817	3919	32
33	2826	2908	2992	3077	3163	3251	3341	3433	3526	3622	3719	3819	3921	33
34	2828	2910	2993	3078	3165	3253	3343	3434	3528	3623	3721	3821	3923	34
35	2829	2911	2995	3080	3166	3254	3344	3436	3529	3625	3722	3822	3925	35
36	2830	2913	2996	3081	3168	3256	3346	3437	3531	3626	3724	3824	3926	36
37	2832	2914	2998	3083	3169	3257	3347	3439	3532	3628	3726	3826	3928	37
38	2833	2915	2999	3084	3171	3259	3349	3440	3534	3630	3727	3827	3930	38
39	2834	2917	3000	3085	3172	3260	3350	3442	3536	3631	3729	3829	3932	39
40	2836	2918	3002	3087	3173	3262	3352	3443	3537	3633	3731	3831	3933	40
41	2837	2919	3003	3088	3175	3263	3353	3445	3539	3634	3732	3832	3935	41
42	2839	2921	3005	3090	3176	3265	3355	3447	3540	3636	3734	3834	3937	42
43	2840	2922	3006	3091	3178	3266	3356	3448	3542	3638	3736	3836	3938	43
44	2841	2924	3007	3093	3179	3268	3358	3450	3543	3639	3737	3838	3940	44
45	2843	2925	3009	3094	3181	3269	3359	3451	3545	3641	3739	3839	3942	45
46	2844	2926	3010	3095	3182	3271	3361	3453	3547	3643	3741	3841	3944	46
47	2845	2928	3012	3097	3184	3272	3362	3454	3548	3644	3742	3843	3945	47
48	2847	2929	3013	3098	3185	3274	3364	3456	3550	3646	3744	3844	3947	48
49	2848	2931	3014	3100	3187	3275	3365	3457	3551	3647	3746	3846	3949	49
50	2849	2932	3016	3101	3188	3277	3367	3459	3553	3649	3747	3848	3951	50
51	2851	2933	3017	3103	3190	3278	3368	3460	3555	3651	3749	3849	3952	51
52	2852	2935	3019	3104	3191	3280	3370	3462	3556	3652	3750	3851	3954	52
53	2854	2936	3020	3105	3192	3281	3371	3464	3558	3654	3752	3853	3956	53
54	2855	2937	3021	3107	3194	3283	3373	3465	3559	3655	3754	3854	3958	54
55	2856	2939	3023	3108	3195	3284	3374	3467	3561	3657	3755	3856	3959	55
56	2858	2940	3024	3110	3197	3286	3376	3468	3562	3659	3757	3858	3961	56
57	2859	2942	3026	3111	3198	3287	3378	3470	3564	3660	3759	3860	3963	57
58	2860	2943	3027	3113	3200	3289	3379	3471	3566	3662	3760	3861	3964	58
59	2862	2944	3029	3114	3201	3290	3381	3473	3567	3664	3762	3863	3966	59
M	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	M

TABLE III. MERIDIONAL PARTS.

M	55°	56°	57°	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°	M
0	3968	4074	4183	4294	4409	4527	4649	4775	4905	5039	5179	5324	5474	0
1	3970	4076	4184	4296	4411	4529	4651	4777	4907	5042	5181	5326	5477	1
2	3971	4077	4186	4298	4413	4531	4653	4779	4909	5044	5184	5328	5479	2
3	3973	4079	4188	4300	4415	4533	4655	4781	4912	5046	5186	5331	5482	3
4	3975	4081	4190	4302	4417	4535	4657	4784	4914	5049	5188	5333	5484	4
5	3977	4083	4192	4304	4419	4537	4660	4786	4916	5051	5191	5336	5487	5
6	3978	4085	4194	4306	4421	4539	4662	4788	4918	5053	5193	5338	5489	6
7	3980	4086	4195	4308	4423	4541	4664	4790	4920	5055	5195	5341	5492	7
8	3982	4088	4197	4309	4425	4543	4666	4792	4923	5058	5198	5343	5495	8
9	3984	4090	4199	4311	4427	4545	4668	4794	4925	5060	5200	5346	5497	9
10	3985	4092	4201	4313	4429	4547	4670	4796	4927	5062	5203	5348	5500	10
11	3987	4094	4203	4315	4431	4549	4672	4798	4929	5065	5205	5351	5502	11
12	3989	4095	4205	4317	4433	4551	4674	4801	4931	5067	5207	5353	5505	12
13	3991	4097	4207	4319	4434	4553	4676	4803	4934	5069	5210	5356	5507	13
14	3992	4099	4208	4321	4436	4555	4678	4805	4936	5071	5212	5358	5510	14
15	3994	4101	4210	4323	4438	4557	4680	4807	4938	5074	5214	5361	5513	15
16	3996	4103	4212	4325	4440	4559	4682	4809	4940	5076	5217	5363	5515	16
17	3998	4104	4214	4327	4442	4562	4684	4811	4943	5078	5219	5366	5518	17
18	3999	4106	4216	4328	4444	4564	4687	4814	4945	5081	5222	5368	5520	18
19	4001	4108	4218	4330	4446	4566	4689	4816	4947	5083	5224	5371	5523	19
20	4003	4110	4220	4332	4448	4568	4691	4818	4949	5085	5226	5373	5526	20
21	4005	4112	4221	4334	4450	4570	4693	4820	4951	5088	5229	5376	5528	21
22	4006	4113	4223	4336	4452	4572	4695	4822	4954	5090	5231	5378	5531	22
23	4008	4115	4225	4338	4454	4574	4697	4824	4956	5092	5234	5380	5533	23
24	4010	4117	4227	4340	4456	4576	4699	4826	4958	5095	5236	5383	5536	24
25	4012	4119	4229	4342	4458	4578	4701	4829	4960	5097	5238	5385	5539	25
26	4014	4121	4231	4344	4460	4580	4703	4831	4963	5099	5241	5388	5541	26
27	4015	4122	4232	4346	4462	4582	4705	4833	4965	5102	5243	5390	5544	27
28	4017	4124	4234	4347	4464	4584	4707	4835	4967	5104	5246	5393	5546	28
29	4019	4126	4236	4349	4466	4586	4710	4837	4969	5106	5248	5395	5549	29
30	4021	4128	4238	4351	4468	4588	4712	4839	4972	5108	5250	5398	5552	30
31	4022	4130	4240	4353	4470	4590	4714	4842	4974	5111	5253	5401	5554	31
32	4024	4132	4242	4355	4472	4592	4716	4844	4976	5113	5255	5403	5557	32
33	4026	4133	4244	4357	4474	4594	4718	4846	4978	5115	5258	5406	5559	33
34	4028	4135	4246	4359	4476	4596	4720	4848	4981	5118	5260	5408	5562	34
35	4029	4137	4247	4361	4478	4598	4722	4850	4983	5120	5263	5411	5565	35
36	4031	4139	4249	4363	4480	4600	4724	4852	4985	5122	5265	5413	5567	36
37	4033	4141	4251	4365	4482	4602	4726	4855	4987	5125	5267	5416	5570	37
38	4035	4142	4253	4367	4484	4604	4728	4857	4990	5127	5270	5418	5573	38
39	4037	4144	4255	4369	4486	4606	4731	4859	4992	5129	5272	5421	5575	39
40	4038	4146	4257	4370	4488	4608	4733	4861	4994	5132	5275	5423	5578	40
41	4040	4148	4259	4372	4490	4610	4735	4863	4996	5134	5277	5426	5580	41
42	4042	4150	4260	4374	4492	4612	4737	4865	4999	5136	5280	5428	5583	42
43	4044	4152	4262	4376	4494	4614	4739	4868	5001	5139	5282	5431	5586	43
44	4045	4153	4264	4378	4495	4616	4741	4870	5003	5141	5284	5433	5588	44
45	4047	4155	4266	4380	4497	4618	4743	4872	5005	5143	5287	5436	5591	45
46	4049	4157	4268	4382	4499	4620	4745	4874	5008	5146	5289	5438	5594	46
47	4051	4159	4270	4384	4501	4623	4747	4876	5010	5148	5292	5441	5596	47
48	4052	4161	4272	4386	4503	4625	4750	4879	5012	5151	5294	5443	5599	48
49	4054	4162	4274	4388	4505	4627	4752	4881	5014	5153	5297	5446	5602	49
50	4056	4164	4275	4390	4507	4629	4754	4883	5017	5155	5299	5448	5604	50
51	4058	4166	4277	4392	4509	4631	4756	4885	5019	5158	5301	5451	5607	51
52	4060	4168	4279	4394	4511	4633	4758	4887	5021	5160	5304	5454	5610	52
53	4061	4170	4281	4396	4513	4635	4760	4890	5023	5162	5306	5456	5612	53
54	4063	4172	4283	4398	4515	4637	4762	4892	5026	5165	5309	5459	5615	54
55	4065	4173	4285	4399	4517	4639	4764	4894	5028	5167	5311	5461	5617	55
56	4067	4175	4287	4401	4519	4641	4766	4896	5030	5169	5314	5464	5620	56
57	4069	4177	4289	4403	4521	4643	4769	4898	5033	5172	5316	5466	5623	57
58	4070	4179	4291	4405	4523	4645	4771	4901	5035	5174	5319	5469	5625	58
59	4072	4181	4292	4407	4525	4647	4773	4903	5037	5176	5321	5471	5628	59
M	55°	56°	57°	58°	59°	60°	61°	62°	63°	°64	65°	66°	67°	M

TABLE III. MERIDIONAL PARTS.

M	68°	69°	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	M
0	5631	5795	5966	6146	6335	6534	6746	6970	7210	7467	7745	8046	8375	0
1	5633	5797	5969	6149	6338	6538	6749	6974	7214	7472	7749	8051	8381	1
2	5636	5800	5972	6152	6341	6541	6753	6978	7218	7476	7754	8056	8387	2
3	5639	5803	5975	6155	6345	6545	6757	6982	7222	7481	7759	8061	8393	3
4	5642	5806	5978	6158	6348	6548	6760	6986	7227	7485	7764	8067	8398	4
5	5644	5809	5981	6161	6351	6552	6764	6990	7231	7490	7769	8072	8404	5
6	5647	5811	5984	6164	6354	6555	6768	6994	7235	7494	7774	8077	8410	6
7	5650	5814	5986	6167	6358	6558	6771	6997	7239	7498	7778	8083	8416	7
8	5652	5817	5989	6170	6361	6562	6775	7001	7243	7503	7783	8088	8422	8
9	5655	5820	5992	6173	6364	6565	6779	7005	7247	7507	7788	8093	8427	9
10	5658	5823	5995	6177	6367	6569	6782	7009	7252	7512	7793	8099	8433	10
11	5660	5825	5998	6180	6371	6572	6786	7013	7256	7516	7798	8104	8439	11
12	5663	5828	6001	6183	6374	6576	6790	7017	7260	7521	7803	8109	8445	12
13	5666	5831	6004	6186	6377	6579	6793	7021	7264	7525	7808	8115	8451	13
14	5668	5834	6007	6189	6380	6583	6797	7025	7268	7530	7813	8120	8457	14
15	5671	5837	6010	6192	6384	6586	6801	7029	7273	7535	7817	8125	8463	15
16	5674	5839	6013	6195	6387	6590	6804	7033	7277	7539	7822	8131	8469	16
17	5676	5842	6016	6198	6390	6593	6808	7037	7281	7544	7827	8136	8474	17
18	5679	5845	6019	6201	6394	6597	6812	7041	7285	7548	7832	8141	8480	18
19	5682	5848	6022	6205	6397	6600	6815	7045	7289	7553	7837	8147	8486	19
20	5685	5851	6025	6208	6400	6603	6819	7048	7294	7557	7842	8152	8492	20
21	5687	5854	6028	6211	6403	6607	6823	7052	7298	7562	7847	8158	8498	21
22	5690	5856	6031	6214	6407	6610	6826	7056	7302	7566	7852	8163	8504	22
23	5693	5859	6034	6217	6410	6614	6830	7060	7306	7571	7857	8168	8510	23
24	5695	5862	6037	6220	6413	6617	6834	7064	7311	7576	7862	8174	8516	24
25	5698	5865	6040	6223	6417	6621	6838	7068	7315	7580	7867	8179	8522	25
26	5701	5868	6043	6226	6420	6624	6841	7072	7319	7585	7872	8185	8528	26
27	5704	5871	6046	6230	6423	6628	6845	7076	7323	7589	7877	8190	8534	27
28	5706	5874	6049	6233	6427	6631	6849	7080	7328	7594	7882	8196	8540	28
29	5709	5876	6052	6236	6430	6635	6853	7084	7332	7599	7887	8201	8546	29
30	5712	5879	6055	6239	6433	6639	6856	7088	7336	7603	7892	8207	8552	30
31	5715	5882	6058	6242	6437	6642	6860	7092	7341	7608	7897	8212	8558	31
32	5717	5885	6061	6245	6440	6646	6864	7096	7345	7612	7902	8218	8565	32
33	5720	5888	6064	6249	6443	6649	6868	7100	7349	7617	7907	8223	8571	33
34	5723	5891	6067	6252	6447	6653	6871	7104	7353	7622	7912	8229	8577	34
35	5725	5894	6070	6255	6450	6656	6875	7108	7358	7626	7917	8234	8583	35
36	5728	5896	6073	6258	6453	6660	6879	7112	7362	7631	7922	8240	8589	36
37	5731	5899	6076	6261	6457	6663	6883	7116	7366	7636	7927	8245	8595	37
38	5734	5902	6079	6264	6460	6667	6886	7120	7371	7640	7932	8251	8601	38
39	5736	5905	6082	6268	6463	6670	6890	7124	7375	7645	7937	8256	8607	39
40	5739	5908	6085	6271	9467	6674	6894	7128	7379	7650	7942	8262	8614	40
41	5742	5911	6088	6274	6470	6677	6898	7132	7384	7654	7948	8267	8620	41
42	5745	5914	6091	6277	6473	6681	6901	7136	7388	7659	7953	8273	8626	42
43	5747	5917	6094	6280	6477	6685	6905	7140	7392	7664	7958	8279	8632	43
44	5750	5919	6097	6283	6480	6688	6909	7145	7397	7668	7963	8284	8638	44
45	5753	5922	6100	6287	6483	6692	6913	7149	7401	7673	7968	8290	8644	45
46	5756	5925	6103	6290	6487	6695	6917	7153	7406	7678	7973	8295	8651	46
47	5758	5928	6106	6293	6490	6699	6920	7157	7410	7683	7978	8301	8657	47
48	5761	5931	6109	6296	6494	6702	6924	7161	7414	7687	7983	8307	8663	48
49	5764	5934	6112	6299	6497	6706	6928	7165	7419	7692	7989	8312	8669	49
50	5767	5937	6115	6303	6500	6710	6932	7169	7423	7697	7994	8318	8676	50
51	5770	5940	6118	6306	6504	6713	6936	7173	7427	7702	7999	8324	8682	51
52	5772	5943	6121	6309	6507	6717	6940	7177	7432	7706	8004	8329	8688	52
53	5775	5946	6124	6312	6511	6720	6943	7131	7436	7711	8009	8335	8695	53
54	5778	5948	6127	6315	6514	6724	6947	7185	7441	7716	8014	8341	8701	54
55	5781	5951	6130	6319	6517	6728	6951	7189	7445	7721	8020	8347	8707	55
56	5783	5954	6133	6322	6521	6731	6955	7194	7449	7725	8025	8352	8714	56
57	5786	5957	6136	6325	6524	6735	6959	7198	7454	7730	8030	8358	8720	57
58	5789	5960	6140	6328	6528	6738	6963	7202	7458	7735	8035	8364	8726	58
59	5792	5963	6143	6332	6531	6742	6966	7206	7463	7740	8040	8369	8733	59
M	68°	69°	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	M

TABLE IV. MEAN REFRACTION.

App. Alt.	Refr.	App Alt	Refr.	App. Alt.	Refr.	App. Alt.	Refr.	App. Alt.	Refr.
° ′	′ ″	° ′	′ ″	° ′	′ ″	° ′	′ ″	° ′	′ ″
0 0	33 0	5 0	9 54	10 0	5 15	20 0	2 35	34 0	1 24
0 5	32 10	5 5	9 46	10 10	5 10	20 10	2 34	34 30	1 23
0 10	31 22	5 10	9 38	10 20	5 5	20 20	2 32	35 0	1 21
0 15	30 35	5 15	9 30	10 30	5 0	20 30	2 31	35 30	1 20
0 20	29 50	5 20	9 23	10 40	4 56	20 40	2 29	36 0	1 18
0 25	29 6	5 25	9 15	10 50	4 51	20 50	2 28	36 30	1 17
0 30	28 23	5 30	9 8	11 0	4 47	21 0	2 27	37 0	1 16
0 35	27 41	5 35	9 1	11 10	4 43	21 10	2 26	37 30	1 14
0 40	27 0	5 40	8 54	11 20	4 39	21 20	2 25	38 0	1 13
0 45	26 20	5 45	8 47	11 30	4 34	21 30	2 24	38 30	1 11
0 50	25 42	5 50	8 41	11 40	4 31	21 40	2 23	39 0	1 10
0 55	25 5	5 55	8 34	11 50	4 27	21 50	2 21	39 30	1 9
1 0	24 29	6 0	8 28	12 0	4 23	22 0	2 20	40 0	1 8
1 5	23 54	6 5	8 21	12 10	4 20	22 10	2 19	41 0	1 5
1 10	23 20	6 10	8 15	12 20	4 16	22 20	2 18	42 0	1 3
1 15	22 47	6 15	8 9	12 30	4 13	22 30	2 17	43 0	1 1
1 20	22 15	6 20	8 3	12 40	4 9	22 40	2 16	44 0	0 59
1 25	21 44	6 25	7 57	12 50	4 6	22 50	2 15	45 0	0 57
1 30	21 15	6 30	7 51	13 0	4 3	23 0	2 14	46 0	0 55
1 35	20 46	6 35	7 45	13 10	4 0	23 10	2 13	47 0	0 53
1 40	20 18	6 40	7 40	13 20	3 57	23 20	2 12	48 0	0 51
1 45	19 51	6 45	7 35	13 30	3 54	23 30	2 11	49 0	0 49
1 50	19 25	6 50	7 30	13 40	3 51	23 40	2 10	50 0	0 48
1 55	19 0	6 55	7 25	13 50	3 48	23 50	2 9	51 0	0 46
2 0	18 35	7 0	7 20	14 0	3 45	24 0	2 8	52 0	0 44
2 5	18 11	7 5	7 15	14 10	3 43	24 10	2 7	53 0	0 43
2 10	17 48	7 10	7 11	14 20	3 40	24 20	2 6	54 0	0 41
2 15	17 26	7 15	7 6	14 30	3 38	24 30	2 5	55 0	0 40
2 20	17 4	7 20	7 2	14 40	3 35	24 40	2 4	56 0	0 38
2 25	16 44	7 25	6 57	14 50	3 33	24 50	2 3	57 0	0 37
2 30	16 24	7 30	6 53	15 0	3 30	25 0	2 2	58 0	0 35
2 35	16 4	7 35	6 49	15 10	3 28	25 10	2 1	59 0	0 34
2 40	15 45	7 40	6 45	15 20	3 26	25 20	2 0	60 0	0 33
2 45	15 27	7 45	6 41	15 30	3 24	25 30	1 59	61 0	0 32
2 50	15 9	7 50	6 37	15 40	3 21	25 40	1 58	62 0	0 30
2 55	14 52	7 55	6 33	15 50	3 19	25 50	1 57	63 0	0 29
3 0	14 36	8 0	6 29	16 0	3 17	26 0	1 56	64 0	0 28
3 5	14 20	8 5	6 25	16 10	3 15	26 10	1 55	65 0	0 26
3 10	14 4	8 10	6 22	16 20	3 12	26 20	1 55	66 0	0 25
3 15	13 49	8 15	6 18	16 30	3 10	26 30	1 54	67 0	0 24
3 20	13 34	8 20	6 15	16 40	3 8	26 40	1 53	68 0	0 23
3 25	13 20	8 25	6 11	16 50	3 6	26 50	1 52	69 0	0 22
3 30	13 6	8 30	6 8	17 0	3 4	27 0	1 51	70 0	0 21
3 35	12 53	8 35	6 5	17 10	3 3	27 15	1 50	71 0	0 19
3 40	12 40	8 40	6 1	17 20	3 1	27 30	1 49	72 0	0 18
3 45	12 27	8 45	5 58	17 30	2 59	27 45	1 48	73 0	0 17
3 50	12 15	8 50	5 55	17 40	2 57	28 0	1 47	74 0	0 16
3 55	12 3	8 55	5 52	17 50	2 55	28 15	1 46	75 0	0 15
4 0	11 51	9 0	5 48	18 0	2 54	28 30	1 45	76 0	0 14
4 5	11 40	9 5	5 45	18 10	2 52	28 45	1 44	77 0	0 13
4 10	11 29	9 10	5 42	18 20	2 51	29 0	1 42	78 0	0 12
4 15	11 18	9 15	5 39	18 30	2 49	29 30	1 40	79 0	0 11
4 20	11 8	9 20	5 36	18 40	2 47	30 0	1 38	80 0	0 10
4 25	10 58	9 25	5 34	18 50	2 46	30 30	1 37	81 0	0 9
4 30	10 48	9 30	5 31	19 0	2 44	31 0	1 35	82 0	0 8
4 35	10 39	9 35	5 28	19 10	2 43	31 30	1 33	83 0	0 7
4 40	10 29	9 40	5 26	19 20	2 41	32 0	1 31	84 0	0 6
4 45	10 20	9 45	5 23	19 30	2 40	32 30	1 30	86 0	0 4
4 50	10 11	9 50	5 20	19 40	2 38	33 0	1 28	88 0	0 2
4 55	10 2	9 55	5 18	19 50	2 37	33 30	1 26	90 0	0 0

TABLE V.
Dip of the Horizon.

Height	Dip
Feet	′ ″
1	0 58
2	1 21
3	1 40
4	1 56
5	2 9
6	2 21
7	2 33
8	2 44
9	2 53
10	3 2
11	3 10
12	3 19
13	3 27
14	3 36
15	3 42
16	3 50
17	3 57
18	4 4
19	4 11
20	4 17
21	4 23
22	4 30
23	4 36
24	4 42
26	4 52
28	5 5
30	5 15
35	5 39
40	6 4
45	6 27
50	6 46
60	7 25
70	8 1
80	8 34
90	9 6
100	9 35

TABLE VI.
Sun's Parallax in Alt.

Alt.	Parall.
°	″
0	9
10	9
20	8
30	8
40	7
50	6
55	5
60	4
65	4
70	3
75	2
80	2
85	1
90	0

TAB. VII.
Moon's Augmentat.

Alt.	Augm.
°	″
0	0
5	1
10	3
15	4
20	6
25	7
30	8
35	9
40	10
45	11
50	12
55	13
60	14
70	15
80	15
90	16

TABLE VIII.
Dip. of sea at different Distances from the Observer.

Miles.	Height of the Eye in Feet.					
	5	10	15	20	25	30
¼	11′	23′	34′	45′	57′	68′
½	6	12	17	23	28	34
¾	4	8	12	15	19	23
1	3	6	9	12	15	17
1¼	3	5	7	10	12	14
1½	3	4	6	8	10	12
2	2	4	5	7	8	9
2½	2	3	4	6	7	8
3	2	3	4	5	6	7
3½	2	3	4	5	6	6
4	2	3	4	5	5	6
5	2	3	4	4	5	6
6	2	3	4	4	5	5

TABLE IX.

THE

SUN'S DECLINATION,

For the Year 1816, or 1820, 1824, 1828.

EACH BEING LEAP YEAR.

Days	Jan.		Feb.		Mar.		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	South		South		South		North		North		North		North		North		North		South		South		South.	
	D	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'
1	23	5	17	19	7	30	4	37	15	8	22	5	23	8	18	1	8	15	3	14	14	30	21	52
2	23	0	17	2	7	7	5	0	15	26	22	13	23	3	17	46	7	54	3	38	14	49	22	1
3	22	55	16	45	6	45	5	23	15	43	22	21	22	59	17	30	7	31	4	1	15	8	22	9
4	22	49	16	28	6	21	5	46	16	1	22	28	22	54	17	14	7	9	4	24	15	27	22	17
5	22	43	16	10	5	58	6	8	16	18	22	35	22	48	16	58	6	47	4	47	15	45	22	25
6	22	36	15	51	5	35	6	31	16	35	22	41	22	42	16	42	6	25	5	10	16	3	22	33
7	22	29	15	33	5	12	6	54	16	52	22	47	22	36	16	25	6	2	5	33	16	21	22	39
8	22	22	15	14	4	48	7	16	17	8	22	52	22	30	16	8	5	40	5	56	16	39	22	46
9	22	14	14	55	4	25	7	38	17	24	22	58	22	23	15	51	5	17	6	19	16	56	22	52
10	22	5	14	36	4	2	8	1	17	40	23	2	22	15	15	34	4	54	6	42	17	13	22	57
11	21	56	14	17	3	38	8	23	17	55	23	7	22	7	15	16	4	32	7	5	17	29	23	2
12	21	47	13	57	3	14	8	45	18	11	23	11	21	59	14	58	4	9	7	27	17	46	23	7
13	21	37	13	37	2	51	9	6	18	25	23	14	21	51	14	40	3	46	7	50	18	2	23	11
14	21	27	13	17	2	27	9	28	18	40	23	17	21	42	14	21	3	23	8	12	18	18	23	15
15	21	17	12	57	2	4	9	50	18	54	23	20	21	32	14	3	2	59	8	35	18	33	23	18
16	21	6	12	36	1	40	10	11	19	8	23	22	21	23	13	44	2	36	8	57	18	48	23	21
17	20	54	12	15	1	16	10	32	19	22	23	24	21	13	13	25	2	13	9	19	19	3	23	23
18	20	43	11	54	0	52	10	53	19	35	23	26	21	2	13	5	1	50	9	41	19	18	23	25
19	20	30	11	33	0	29	11	14	19	48	23	27	20	51	12	46	1	26	10	3	19	32	23	27
20	20	18	11	12	0	5	11	34	20	1	23	28	20	40	12	26	1	3	10	24	19	45	23	27
21	20	5	10	51	0	19N	11	55	20	13	23	28	20	29	12	6	0	40	10	46	19	59	23	28
22	19	52	10	29	0	42	12	15	20	25	23	28	20	17	11	46	0	16	11	7	20	12	23	28
23	19	38	10	7	1	6	12	35	20	37	23	27	20	5	11	26	0	7S	11	28	20	24	23	27
24	19	24	9	45	1	30	12	55	20	48	23	26	19	53	11	5	0	31	11	49	20	37	23	26
25	19	10	9	23	1	53	13	15	20	59	23	25	19	40	10	45	0	54	12	10	20	49	23	25
26	18	55	9	1	2	17	13	34	21	10	23	23	19	27	10	24	1	17	12	31	21	0	23	23
27	18	40	8	38	2	40	13	53	21	20	23	21	19	13	10	3	1	41	12	51	21	11	23	20
28	18	24	8	16	3	4	14	12	21	30	23	18	18	59	9	42	2	4	13	11	21	22	23	18
29	18	9	7	53	3	27	14	31	21	39	23	15	18	45	9	20	2	28	13	31	21	32	23	14
30	17	53			3	50	14	49	21	48	23	12	18	31	8	59	2	51	13	51	21	42	23	10
31	17	36			4	14			21	57			18	16	8	37			14	11	....		23	6

TABLE IX.

THE

SUN'S DECLINATION,

For the Year 1817, or 1821, 1825, 1829.

BEING THE FIRST AFTER LEAP YEAR.

Days.	Jan.		Feb.		Mar.		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	South		South		South		North		North		North		North		North		North		South		South		South.	
	D	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
1	23	1	17	7	7	37	4	30	15	2	22	3	23	9	18	5	8	21	3	8	14	25	21	49
2	22	56	16	50	7	14	4	53	15	21	22	11	23	5	17	50	7	59	3	31	14	44	21	58
3	22	51	16	32	6	51	5	16	15	38	22	18	23	0	17	35	7	38	3	55	15	3	22	7
4	22	45	16	14	6	28	5	39	15	56	22	25	22	55	17	19	7	15	4	18	15	22	22	15
5	22	38	15	56	6	5	6	2	16	13	22	33	22	50	17	3	6	53	4	41	15	40	22	23
6	22	31	15	38	5	41	6	25	16	30	22	39	22	44	16	46	6	31	5	4	15	58	22	30
7	22	24	15	19	5	18	6	47	16	47	22	45	22	38	16	30	6	8	5	27	16	16	22	37
8	22	16	15	1	4	55	7	10	17	3	22	51	22	31	16	13	5	46	5	50	16	34	22	44
9	22	7	14	41	4	31	7	32	17	20	22	56	22	24	15	56	5	23	6	13	16	51	22	50
10	21	59	14	22	4	8	7	55	17	35	23	1	22	17	15	38	5	1	6	36	17	8	22	56
11	21	49	14	2	3	44	8	17	17	51	23	5	22	9	15	21	4	38	6	59	17	25	23	1
12	21	40	13	43	3	21	8	39	18	6	23	10	22	1	15	3	4	15	7	21	17	41	23	6
13	21	30	13	23	2	57	9	0	18	21	23	13	21	53	14	45	3	52	7	44	17	58	23	10
14	21	19	13	2	2	34	9	22	18	36	23	16	21	44	14	26	3	29	8	6	18	13	23	14
15	21	9	12	42	2	10	9	44	18	50	23	19	21	35	14	8	3	6	8	29	18	29	23	17
16	20	57	12	21	1	46	10	5	19	4	23	22	21	25	13	49	2	43	8	51	18	44	23	20
17	20	46	12	0	1	23	10	26	19	18	23	24	21	15	13	30	2	19	9	13	18	59	23	23
18	20	34	11	39	0	59	10	47	19	32	23	25	21	5	13	11	1	56	9	35	19	14	23	25
19	20	21	11	18	0	35	11	8	19	45	23	27	20	54	12	51	1	33	9	57	19	28	23	26
20	20	8	10	56	0	12	11	29	19	57	23	27	20	43	12	32	1	10	10	18	19	42	23	27
21	19	55	10	35	0	12N	11	49	20	10	23	28	20	32	12	12	0	46	10	40	19	55	23	28
22	19	42	10	13	0	36	12	9	20	22	23	28	20	22	11	52	0	23	11	1	20	8	23	28
23	19	28	9	51	0	59	12	30	20	34	23	27	20	8	11	31	0	1S	11	22	20	21	23	27
24	19	13	9	29	1	23	12	49	20	45	23	26	19	56	11	11	0	24	11	44	20	33	23	26
25	18	59	9	7	1	47	13	9	20	56	23	25	19	43	10	50	0	48	12	4	20	45	23	25
26	18	44	8	44	2	10	13	29	21	7	23	23	19	30	10	29	1	11	12	25	20	57	23	23
27	18	29	8	22	2	34	13	48	21	17	23	21	19	17	10	8	1	34	12	46	21	8	23	21
28	18	13	7	59	2	57	14	7	21	27	23	19	19	3	9	47	1	58	13	6	21	19	23	18
29	17	57			3	21	14	26	21	36	23	16	18	49	9	26	2	21	13	26	21	29	23	15
30	17	41			3	44	14	44	21	46	23	12	18	35	9	5	2	45	13	46	21	39	23	11
31	17	24			4	7			21	54			18	20	8	43			14	5			23	7

TABLE IX.

THE

SUN'S DECLINATION,

For the Year 1814, or 1818, 1822, 1826.

BEING THE SECOND AFTER LEAP YEAR.

Days.	Jan.		Feb.		Mar.		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	South		South		South		North		North		North		North		North		North		South		South		South.	
	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'
1	23	3	17	11	7	42	4	25	14	58	22	1	23	10	18	9	8	27	3	2	14	20	21	47
2	22	58	16	54	7	19	4	48	15	16	22	9	23	6	17	54	8	5	3	26	14	39	21	56
3	22	52	16	37	6	56	5	11	15	34	22	17	23	1	17	38	7	43	3	49	14	58	22	5
4	22	46	16	19	6	33	5	34	15	52	22	24	22	56	17	23	7	21	4	12	15	17	22	13
5	22	40	16	1	6	10	5	56	16	9	22	31	22	51	17	7	6	59	4	35	15	36	22	21
6	22	33	15	43	5	47	6	19	16	26	22	38	22	45	16	50	6	36	4	59	15	54	22	29
7	22	25	15	24	5	24	6	42	16	43	22	44	22	39	16	34	6	14	5	22	16	12	22	36
8	22	18	15	5	5	1	7	4	16	59	22	49	22	33	16	17	5	51	5	45	16	30	22	43
9	22	9	14	46	4	37	7	27	17	16	22	55	22	26	16	0	5	29	6	8	16	47	22	49
10	22	1	14	27	4	14	7	49	17	32	23	0	22	19	15	43	5	6	6	31	17	4	22	55
11	21	52	14	7	3	50	8	11	17	47	23	4	22	11	15	25	4	43	6	53	17	21	23	0
12	21	42	13	48	3	27	8	33	18	3	23	9	22	3	15	7	4	20	7	16	17	38	23	5
13	21	32	13	28	3	3	8	55	18	18	23	12	21	55	14	49	3	57	7	39	17	54	23	9
14	21	22	13	7	2	40	9	17	18	32	23	16	21	46	14	31	3	34	8	1	18	10	23	13
15	21	11	12	47	2	16	9	38	18	47	23	19	21	37	14	12	3	11	8	23	18	25	23	17
16	21	0	12	26	1	52	10	0	19	1	23	21	21	28	13	53	2	48	8	46	18	41	23	20
17	20	49	12	5	1	29	10	21	19	15	23	23	21	18	13	34	2	25	9	8	18	56	23	22
18	20	37	11	44	1	5	10	42	19	28	23	25	21	8	13	15	2	2	9	30	19	10	23	24
19	20	24	11	23	0	41	11	3	19	42	23	26	20	57	12	56	1	38	9	52	19	24	23	26
20	20	12	11	2	0	17	11	24	19	54	23	27	20	46	12	36	1	15	10	13	19	38	23	27
21	19	58	10	40	0	6N	11	44	20	7	23	28	20	35	12	16	0	52	10	35	19	52	23	28
22	19	45	10	18	0	30	12	5	20	19	23	28	20	23	11	56	0	28	10	56	20	5	23	28
23	19	31	9	56	0	54	12	25	20	31	23	27	20	11	11	36	0	5	11	18	20	18	23	28
24	19	17	9	34	1	17	12	45	20	42	23	27	19	59	11	16	0	19S	11	39	20	30	23	27
25	19	2	9	12	1	41	13	4	20	53	23	25	19	46	10	55	0	42	11	59	20	43	23	26
26	18	48	8	50	2	4	13	24	21	4	23	24	19	33	10	34	1	5	12	20	20	54	23	24
27	18	32	8	27	2	28	13	43	21	14	23	22	19	20	10	13	1	29	12	41	21	6	23	22
28	18	17	8	5	2	51	14	2	21	24	23	19	19	6	9	52	1	52	13	1	21	16	23	19
29	18	1			3	15	14	21	21	34	23	17	18	53	9	31	2	16	13	21	21	27	23	16
30	17	45			3	38	14	40	21	43	23	13	18	38	9	10	2	39	13	41	21	37	23	12
31	17	28			4	1			21	52			18	24	8	48			14	1			23	8

TABLE IX.

THE

SUN'S DECLINATION,

For the Year 1815, or 1819, 1823, 1827.

BEING THE THIRD AFTER LEAP YEAR.

Days.	Jan.		Feb.		Mar.		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	South		South		South		North		North		North		North		North		North		South		South		South	
	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'	°	'
1	23	3	17	15	7	48	4	19	14	54	21	59	23	11	18	13	8	32	2	57	14	15	21	44
2	22	59	16	58	7	25	4	42	15	12	22	7	23	7	17	58	8	10	3	20	14	35	21	54
3	22	53	16	41	7	2	5	5	15	30	22	15	23	2	17	42	7	48	3	43	14	54	22	3
4	22	48	16	23	6	39	5	28	15	47	22	22	22	58	17	27	7	26	4	7	15	13	22	11
5	22	41	16	5	6	16	5	51	16	5	22	29	22	52	17	11	7	4	4	30	15	31	22	19
6	22	35	15	47	5	53	6	14	16	22	22	36	22	47	16	54	6	42	4	53	15	50	22	27
7	22	27	15	29	5	30	6	36	16	39	22	42	22	41	16	38	6	19	5	16	16	8	22	34
8	22	20	15	10	5	6	6	59	16	55	22	48	22	35	16	21	5	57	5	39	16	25	22	41
9	22	12	14	51	4	43	7	21	17	12	22	54	22	28	16	4	5	34	6	2	16	43	22	47
10	22	3	14	32	4	19	7	44	17	28	22	59	22	21	15	47	5	11	6	25	17	0	22	53
11	21	54	14	12	3	56	8	6	17	44	23	3	22	13	15	29	4	49	6	48	17	17	22	59
12	21	45	13	52	3	32	8	28	17	59	23	8	22	5	15	11	4	26	7	11	17	34	23	4
13	21	35	13	32	3	9	8	50	18	14	23	12	21	57	14	53	4	3	7	33	17	50	23	8
14	21	25	13	12	2	45	9	12	18	29	23	15	21	48	14	35	3	40	7	56	18	6	23	12
15	21	14	12	52	2	22	9	33	18	44	23	18	21	39	14	17	3	17	8	18	18	22	23	16
16	21	3	12	31	1	58	9	55	18	58	23	21	21	30	13	58	2	54	8	40	18	37	23	19
17	20	51	12	10	1	34	10	16	19	12	23	23	21	20	13	39	2	31	9	2	18	52	23	22
18	20	40	11	49	1	10	10	37	19	25	23	25	21	10	13	20	2	7	9	24	19	7	23	24
19	20	27	11	28	0	47	10	58	19	38	23	26	21	0	13	1	1	44	9	46	19	21	23	25
20	20	15	11	7	0	23	11	19	19	51	23	27	20	49	12	41	1	21	10	8	19	35	23	27
21	20	2	10	45	0	1N	11	39	20	4	23	28	20	38	12	21	0	57	10	30	19	49	23	28
22	19	48	10	24	0	24	12	0	20	16	23	28	20	26	12	1	0	34	10	51	20	2	23	28
23	19	35	10	2	0	48	12	20	20	28	23	28	20	14	11	41	0	11	11	12	20	15	23	28
24	19	20	9	40	1	12	12	40	20	40	23	27	20	2	11	21	0	13S	11	33	20	27	23	27
25	19	6	9	18	1	35	13	0	20	51	23	26	19	49	11	0	0	36	11	54	20	40	23	26
26	18	51	8	55	1	59	13	19	21	2	23	24	19	37	10	39	1	0	12	15	20	51	23	24
27	18	36	8	33	2	22	13	38	21	12	23	22	19	23	10	19	1	23	12	36	21	3	23	22
28	18	21	8	10	2	46	13	58	21	22	23	20	19	10	9	58	1	47	12	56	21	14	23	20
29	18	5			3	9	14	16	21	32	23	17	18	56	9	36	2	10	13	16	21	24	23	17
30	17	49			3	32	14	35	21	41	23	14	18	42	9	15	2	33	13	36	21	35	23	13
31	17	32			3	56			21	50			18	27	8	54			13	56			23	9

The daily differences of declination are the greatest about the 21st of March and September; and the least differences, are near the 21st of June and December, in each year.

In the following TABLE, TO CORRECT THE SUN'S DECLINATION, it is to be noticed,

IN ALL CASES, If the Declination be North increasing, or South increasing, the Difference must be added in West Longitude, and subtracted in East Longitude.

But,—If the Declination be North decreasing or South decreasing, add in East Longitude, and subtract in West Longitude.

Suppose the Declination wanted, for March 20th, 1816, in 90° West Longitude.

March 20th 1816,	Declina.	0° 06′	South decreasing.
	Difference for 90°	0 06	
		0 00	

Had the Declination been wanted for 180° W. Longitude, or at the opposite meridian, it would be found to be 0° 06′ North increasing, as the Sun crossed the equinoctial line, at 90°—and the difference, after that, is additive.

TABLE X. For reducing the SUN'S DECLINATION from noon at Greenwich, to noon under any other Meridian and to any other time under that Meridian.

Long. fr. Greenwich.		d. 10	d. 20	d. 30	d. 40	d. 50	d. 60	d. 70	d. 80	d. 90	d. 100	d. 110	d. 120	d. 130	d. 140	d. 150	d. 160	d. 170	d. 180
Jan. 1	July 2	0′	0′	0′	0′	1′	1′	1′	1′	1′	1′	1′	2′	2′	2′	2′	2′	2′	2′
4	5	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3
7	8	0	0	1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4
10	11	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4
13	14	0	1	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5
16	17	0	1	1	1	2	2	2	3	3	3	4	3	4	4	4	5	6	6
19	20	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6
22	23	0	1	1	2	2	2	2	3	3	4	4	4	5	5	5	6	6	7
25	26	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
28	29	0	1	1	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7
30	31	0	1	1	2	2	3	3	3	4	4	5	5	5	6	6	7	7	7
Feb. 1	Aug. 2	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
4	5	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
7	8	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
10	11	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
13	14	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10
16	17	1	1	2	2	3	3	4	4	5	6	6	7	7	8	8	9	9	10
19	20	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
22	23	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	10	10	11
25	26	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
26	27	1	1	2	3	3	4	4	5	6	6	7	7	8	9	9	10	10	11
Mar. 1	30	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
4	Sep. 2	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
7	5	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
10	8	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	10	11	12
13	11	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	10	11	12
16	14	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	10	11	12
19	17	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	10	11	12
31	30	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	10	11	12
Ap'l 3	Oct. 3	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
6	6	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
9	9	1	1	2	3	3	4	4	5	6	6	7	8	8	9	10	10	11	11
12	12	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
15	15	1	1	[illegible]	2	3	4	4	5	6	6	7	7	8	9	9	10	10	11
18	18	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
21	21	1	1	2	2	3	4	4	5	5	6	6	7	8	8	9	9	10	10
24	24	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9
27	27	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
30	30	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
May 2	Nov. 1	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	9	9
5	4	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
8	7	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	7	8	8
11	10	0	1	1	2	2	3	3	4	4	5	5	5	6	6	7	7	8	8
14	13	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
17	16	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
20	19	0	1	1	2	2	2	3	3	3	4	4	5	5	5	6	6	7	7
23	22	0	1	1	1	2	2	2	3	3	4	4	4	5	5	5	6	6	6
26	25	0	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6
29	28	0	1	1	1	1	2	2	2	3	3	3	3	4	4	4	5	5	5
June 1	Dec. 1	0	0	1	1	1	1	1	2	2	2	3	3	3	3	3	3	4	4
4	4	0	0	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	3
7	7	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3
10	10	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
13	13	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
16	16	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
19	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	25	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
28	23	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
30	30	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	2	2	2
		h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.	h.
		0⅔	1⅓	2.0	2⅔	3⅓	4.0	4⅔	5⅓	6.0	6⅔	7⅓	8.0	8⅔	9⅓	10.0	10⅔	11⅓	12.0

Time from Noon.

K

TABLE XI. THE SUN'S RIGHT ASCENSION.

Days.	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.	Days.
	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	H. M.	
1	18.45	20.57	22.48	0.41	2.32	4.35	6.39	8.44	10.40	12.28	14.24	16.28	1
2	18.49	21.01	22.51	0.45	2.36	4.39	6.43	8.48	10.44	12.32	14.28	16.33	2
3	18.54	21.06	22.55	0.48	2.40	4.43	6.47	8.52	10.47	12.36	14.32	16.37	3
4	18.58	21.10	22.59	0.52	2.44	4.47	6.51	8.56	10.51	12.39	14.36	16.41	4
5	19.03	21.14	23.02	0.56	2.48	4.51	6.56	8.59	10.55	12.43	14.40	16.46	5
6	19.07	21.18	23.06	0.59	2.51	4.55	7.00	9.03	10.58	12.46	14.44	16.50	6
7	19.11	21.22	23.10	1.03	2.55	4.59	7.04	9.07	11.02	12.50	14.48	16.54	7
8	19.16	21.26	23.14	1.07	2.59	5.04	7.08	9.11	11.05	12.54	14.52	16.59	8
9	19.20	21.30	23.17	1.10	3.03	5.08	7.12	9.15	11.09	12.57	14.56	17.03	9
10	19.24	21.34	23.21	1.14	3.07	5.12	7.16	9.19	11.13	13.01	15.00	17.07	10
11	19.29	21.38	23.25	1.18	3.11	5.16	7.20	9.22	11.16	13.05	15.04	17.12	11
12	19.33	21.41	23.28	1.21	3.15	5.20	7.24	9.26	11.20	13.08	15.08	17.16	12
13	19.37	21.45	23.32	1.25	3.19	5.24	7.28	9.30	11.23	13.12	15.12	17.21	13
14	19.42	21.49	23.36	1.29	3.23	5.28	7.32	9.34	11.27	13.16	15.17	17.25	14
15	19.46	21.53	23.39	1.32	3·27	5.33	7.36	9.37	11.31	13.20	15.21	17.30	15
16	19.50	21.57	23.43	1.36	3.30	5.37	7.40	9.41	11.34	13.23	15.25	17.34	16
17	19.55	22.01	23.47	1.40	3.34	5.41	7.45	9.45	11.38	13.27	15.29	17.38	17
18	19.59	22.05	23.50	1.43	3.38	5.45	7.49	9.49	11.41	13.31	15.33	17.43	18
19	20.03	22.09	23.54	1.47	3.42	5.49	7.53	9.52	11.45	13.35	15.37	17.47	19
20	20.07	22.13	23.58	1.51	3.46	5.53	7.57	9.56	11.49	13.38	15.41	17.52	20
21	20.12	22.16	0.01	1.55	3.50	5.58	8.01	10.00	11.52	13.42	15.46	17.56	21
22	20.16	22.20	0.05	1.58	3.54	6.02	8.05	10.04	11.56	13.46	15.50	18.01	22
23	20.20	22.24	0.08	2.02	3.58	6.06	8.09	10.07	11.59	13.50	15.54	18.05	23
24	20.24	22.28	0.12	2.06	4.02	6.10	8.13	10.11	12.03	13.54	15.58	18.09	24
25	20.28	22.32	0.16	2.10	4.06	6.14	8.17	10.15	12.07	13.57	16.02	18.14	25
26	20.33	22.35	0.19	2.13	4.10	6.18	8.20	10.18	12.10	14.01	16.07	18.18	26
27	20.37	22.39	0.23	2.17	4.14	6.22	8.24	10.22	12.14	14.05	16.11	18.23	27
28	20.41	22.43	0.27	2.21	4.19	6.27	8.28	10.26	12.17	14.09	16.15	18.27	28
29	20.45	22.45	0.30	2.25	4.23	6.31	8.32	10.29	12.21	14.13	16.20	18.32	29
30	20.49		0.34	2.28	4.27	6.35	8.36	10.33	12.25	14.17	16.24	18·36	30
31	20.53		0.37		4.31		8.40	10.37		14.21		18.41	31

STARS.—Right Ascension and Declination of 12 of the principal FIXED STARS, adapted to the beginning of the year 1818, with their annual variations.

Names of the STARS.	Characters	Magnitude	Right Ascension.	Ann.var R. A Add.	Declination.	Annual Variation
			H. M. S.	S.Decim	D. M. S	S. Decim
Pole Star, in Little Bear	α	2.3	0.56.25	13.58	88.20.36N	+19.5
Arietis,	α	2.	1.56.55	3.34	22 36 21N	+17.6
Aldebaran,	α	1.	4.25.28	3.42	16.08 06N	+ 8.2
Sirius, Dog star	α	1.	6.37.07	2.65	16.28.34 S	+ 4.3
Pollux, in Southern Twin	β	1.2	7.34.09	3.69	28.27.57N	— 7.9
Regulus. Lion's heart	α	1.2	9.58.39	3.20	12 50.43N	—17 2
Spica, Virgin's spike	α	1.	13.15.36	3 14	10 12.32 S	+19.
Antares, Scorpion's heart	α	1·	16.18.15	3.65	26. 0.09 S	+ 8 7
Lyra, in the Harp	α	1.	18.30.46	1.99	38.36.21N	+ 2.6
Aquila, Altair	α	1.	19.41.53	2.92	8.23.08N	+ 8.5
Fomalhaut, in southern Fish	α	1.	22.47.33	3.33	30.35.27 S	—19.1
Pegasi, Markab	α	2.	22.55:42	2.96	14.13.34N	+19.2

If the right ascension of a Star be wanted for any year after 1818, Multiply the annual variation in R. A. by the number of years after 1818, and add the product to the right ascension as given in the Table; and for part of a year, add the proportional difference of annual variation for any such part of a year. And if the right ascension be wanted for any year previous to 1818, the product of the annual variation multiplied by the time, must be subtracted.

If the Declination of a Star be wanted for any year after 1818, Multiply the annual variation in Declination by the number of years, and add or subtract such product according as the sign + or — is annexed to such annual variation; and for any part of a year, a proportional part of the annual variation must be taken also.—And if the declination be wanted for any year previous to 1818, the product so found must be subtracted, when the sign is + and added, when the sign is —

TABLE XII. AMPLITUDES.

	DECLINATION.													
Lat.	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
1	1. 0	2. 0	3. 0	4. 0	5. 0	6. 0	7. 0	8. 0	9. 0	10. 0	11. 0	12. 0	13. 0	14. 0
3	1. 0	2. 0	3. 0	4. 0	5. 0	6. 0	7. 1	8. 1	9. 1	10. 1	11. 1	12. 1	13. 1	14. 1
5	1. 0	2. 0	3. 1	4. 1	5. 1	6. 1	7. 2	8. 2	9. 2	10. 2	11. 3	12. 3	13. 3	14. 3
7	1. 0	2. 1	3. 1	4. 2	5. 2	6. 3	7. 3	8. 4	9. 4	10. 5	11. 5	12. 5	13. 6	14. 6
9	1. 1	2. 1	3. 2	4. 3	5. 4	6. 5	7. 5	8. 6	9. 7	10. 8	11. 8	12. 9	13.10	14.11
11	1. 1	2. 2	3. 3	4. 4	5. 6	6. 7	7. 8	8. 9	9.10	10.11	11.13	12.14	13.15	14.16
13	1. 2	2. 3	3. 5	4. 6	5. 8	6.10	7.11	8.13	9.14	10.16	11.18	12.19	13.21	14.23
14	1. 2	2. 4	3. 6	4. 7	5. 9	6.11	7.13	8.15	9.17	10.19	11.20	12.22	13.24	14.26
15	1. 2	2. 4	3. 6	4. 8	5.11	6.13	7.15	8.17	9.19	10.21	11.24	12.26	13.28	14.30
16	1. 2	2. 5	3. 7	4.10	5.12	6.15	7.17	8.19	9.22	10.24	11.27	12.29	13.32	14.35
17	1. 3	2. 5	3. 8	4.11	5.14	6.17	7.19	8.22	9.25	10.28	11.31	12.33	13.36	14.39
18	1. 3	2. 6	3. 9	4.12	5.15	6.19	7.22	8.25	9.28	10.31	11.34	12.38	13.41	14.44
19	1. 3	2. 7	3.10	4.14	5.17	6.21	7.24	8.28	9.31	10.35	11.39	12.42	13.46	14.49
20	1. 4	2. 8	3.12	4.15	5.19	6.23	7.27	8.31	9.35	10.39	11.43	12.47	13.51	14.55
21	1. 4	2. 9	3.13	4.17	5.21	6.26	7.30	8.34	9.39	10.43	11.48	12.52	13.57	15. 1
22	1. 5	2. 9	3.14	4.19	5.24	6.28	7.33	8.38	9.43	10.48	11.53	12.57	14. 2	15. 7
23	1. 5	2.10	3.16	4.21	5.26	6.31	7.36	8.42	9.47	10.52	11.58	13. 3	14. 9	15.14
24	1. 6	2.11	3.17	4.23	5.28	6.34	7.40	8.46	9.52	10.57	12. 3	13. 9	14.15	15.21
25	1. 6	2.12	3.19	4.25	5.31	6.37	7.44	8.50	9.56	11. 3	12. 9	13.16	14.22	15.29
26	1. 7	2.14	3.20	4.27	5.34	6.41	7.48	8.54	10. 1	11. 8	12.15	13.22	14.30	15.37
27	1. 7	2.15	3.22	4.29	5.37	6.44	7.52	8.59	10. 7	11.14	12.22	13.30	14.37	15.45
28	1. 8	2.16	3.24	4.32	5.40	6.48	7.56	9. 4	10.12	11.21	12.29	13.37	14.46	15.54
29	1. 9	2.17	3.26	4.34	5.43	6.52	8. 1	9. 9	10.18	11.27	12.36	13.45	14.54	16. 3
30	1. 9	2.19	3.28	4.37	5.47	6.56	8. 5	9.15	10.24	11.34	12.44	13.53	15. 3	16.13
31	1.10	2.20	3.30	4.40	5.50	7. 0	8.10	9.21	10.31	11.41	12.52	14. 2	15.13	16.24
32	1.11	2.22	3.32	4.43	5.54	7. 5	8.16	9.27	10.38	11.49	13. 0	14.11	15.23	16.34
33	1.12	2.23	3.35	4.46	5.58	7.10	8.21	9.33	10.45	11.57	13. 9	14.21	15.34	16.46
34	1.12	2.25	3.37	4.50	6. 2	7.15	8.27	9.40	10.53	12. 5	13.18	14.31	15.45	16.58
35	1.13	2.27	3.40	4.53	6. 6	7.20	8.33	9.47	11. 1	12.14	13.28	14.42	15.56	17.11
36	1.14	2.28	3.43	4.57	6.11	7.25	8.40	9.54	11. 9	12.24	13.39	14.54	16. 9	17.24
37	1.15	2.30	3.45	5. 1	6.16	7.31	8.47	10. 2	11.18	12.33	13.49	15. 5	16.22	17.38
38	1.16	2.32	3.48	5. 5	6.21	7.37	8.54	10.10	11.27	12.44	14. 1	15.18	16.35	17.53
39	1.17	2.34	3.52	5. 9	6.26	7.44	9. 1	10.19	11.37	12.55	14.13	15.31	16.50	18. 8
40	1.18	2.37	3.55	5.13	6.32	7.51	9. 9	10.28	11.47	13. 6	14.25	15.45	17. 5	18.25
41	1.20	2.39	3.59	5.18	6.38	7.58	9.18	10.38	11.58	13.18	14.39	15.59	17.20	18.42
42	1.21	2.42	4. 2	5.23	6.44	8. 5	9.26	10.48	12. 9	13.31	14.53	16.15	17.37	19. 0
43	1.22	2.44	4. 6	5.28	6.51	8.13	9.36	10.58	12.21	13.44	15. 7	16.31	17.55	19.19
44	1.23	2.47	4.10	5.34	6.58	8.21	9.45	11. 9	12.34	13.58	15.23	16.48	18.13	19.39
45	1.25	2.50	4.15	5.40	7.05	8.30	9.55	11.21	12.47	14.13	15.39	17. 6	18.33	20. 0
46	1.26	2.53	4.19	5.46	7.12	8.39	10. 6	11.33	13. 1	14.29	15.57	17.25	18.54	20.23
47	1.28	2.56	4.24	5.52	7.21	8.49	10.18	11.46	13.16	14.45	16.15	17.45	19.16	20.47
48	1.30	2.59	4.29	5.59	7.29	8.59	10.30	12. 0	13.31	15. 2	16.34	18. 6	19.39	21.12
49	1.31	3. 3	4.35	6. 6	7.38	9.10	10.42	12.15	13.48	15.21	16.54	18.29	20. 3	21.38
50	1.33	3. 7	4.40	6.14	7.48	9.22	10.56	12.30	14. 5	15.40	17.16	18.52	20.29	22. 7
51	1.35	3.11	4.46	6.22	7.58	9.34	11.10	12.47	14.24	16. 1	17.39	19.17	20.57	22.36
52	1.37	3.15	4.53	6.30	8. 8	9.47	11.25	13. 4	14.43	16.23	18. 3	19.44	21.26	23. 8
53	1.40	3.19	4.59	6.39	8.20	10. 0	11.41	13.22	15. 4	16.46	18.29	20.13	21.57	23.42
54	1.42	3.24	5. 7	6.49	8.32	10.15	11.58	13.42	15.26	17.11	18.57	20.43	22.30	24.18
55	1.45	3.29	5.14	6.59	8.44	10.30	12.16	14. 3	15.50	17.37	19.26	21.15	23. 5	24.57
56	1.47	3.35	5.22	7.10	8.58	10.46	12.35	14.25	16.15	18. 5	19.57	21.50	23.43	25.38
57	1.50	3.40	5.31	7.22	9.13	11. 4	12.56	14.48	16.42	18.36	20.30	22.26	24.24	26.22
58	1.53	3.47	5.40	7.34	9.28	11.23	13.18	15.14	17.10	19. 8	21. 6	23. 6	25. 7	27.10
59	1.57	3.53	5.50	7.47	9.45	11.43	13.41	15.41	17.41	19.42	21.45	23.49	25.54	28. 1
60	2. 0	4. 0	6. 0	8. 1	10. 2	12. 4	14. 6	16.10	18.14	20.19	22.26	24.34	26.44	28.56
61	2. 4	4. 8	6.12	8.16	10.21	12.27	14.34	16.41	18.49	20.59	23.11	25.24	27.39	29.56
62	2. 8	4.16	6.24	8.33	10.42	12.52	15. 3	17.15	19.28	21.42	23.59	26.17	28.38	31. 1
63	2.12	4.25	6.37	8.50	11. 4	13.19	15.34	17.51	20. 9	22.29	24.51	27.15	29.42	32.12
64	2.17	4.34	6.51	9. 9	11.28	13.48	16. 8	18.31	20.54	23.20	25.48	28.13	30.52	33.36
65	2.22	4.44	7. 7	9.30	11.54	14.19	16.46	19.14	21.44	24.16	26.50	29.28	32.10	34.55
66	2.28	4.55	7.24	9.53	12.22	14.54	17.26	20. 1	22.37	25.16	27.59	30.45	33.35	36.30

TABLE XII. AMPLITUDES.

DECLINATION.

Lat.	15°	16°	17°	18°	19°	20°	21°	21°½	22°	22°½	23°	23°½
°	° '	° '	° '	° '	° '	° '	° '	° '	° '	° '	° '	° '
1	15. 0	16. 0	17. 0	18. 0	19. 0	20. 0	21. 0	21.30	22. 0	22.30	23. 0	23.30
3	15. 1	16. 1	17. 1	18. 2	19. 2	20. 2	21. 2	21.32	22. 2	22.32	23. 2	23.32
5	15. 4	16. 4	17. 4	18. 4	19. 5	20. 5	21. 5	21.35	22. 5	22.35	23. 6	23.36
7	15. 7	16. 7	17. 8	18. 8	19. 9	20. 9	21.10	21.40	22.10	22.41	23.11	23.41
9	15.11	16.12	17.13	18.14	19.15	20.16	21.16	21.47	22.17	22.48	23.18	23.49
11	15.17	16.18	17.20	18.21	19.22	20.23	21.25	21.55	22.26	22.57	23.27	23.58
13	15.24	16.26	17.28	18.29	19.31	20.33	21.35	22. 6	22.37	23. 8	23.38	24. 9
14	15.28	16.30	17.32	18.34	19.36	20.38	21.40	22.11	22.43	23.14	23.45	24.16
15	[illegible]	16.35	17.37	18.39	19.42	20.44	21.47	22.18	22.49	23.20	23.52	24.23
16	[illegible]	16.40	17.42	18.45	19.48	20.51	21.53	22.25	22.56	23.28	23.59	24.30
17	15.42	16.45	17.48	18.51	19.54	20.57	22. 1	22.32	23. 4	23.35	24. 7	24.39
18	15.47	16.51	17.54	18.58	20. 1	21. 5	22. 8	22.40	23.12	23.44	24.15	24.47
19	15.53	16.57	18. 1	19. 5	20. 8	21.12	22.16	22.49	23.20	23.52	24.25	24.57
20	15.59	17. 3	18. 8	19.12	20.16	21.21	22.25	22.57	23.30	24. 2	24.34	25. 7
21	16. 6	17.10	18.15	19.20	20.25	21.29	22.34	23. 7	23.39	24.12	24.45	25.17
22	16.13	17.18	18.23	19.28	20.33	21.39	22.44	23.17	23.50	24.23	24.55	25.28
23	16.20	17.25	18.31	19.37	20.43	21.49	22.55	23.28	24. 1	24.34	25. 7	25.40
24	16.27	17.34	18.40	19.46	20.53	21.59	23. 6	23.39	24.13	24.46	25.19	25.53
25	16.36	17.42	18.49	19.56	21. 3	22.10	23.18	23.51	24.25	24.59	25.32	26. 6
26	16.44	17.52	18.59	20. 7	21.14	22.22	23.30	24. 4	24.38	25.12	25.46	26.20
27	16.53	18. 1	19. 9	20.18	21.26	22.34	23.43	24.17	24.52	25.26	26. 1	26.35
28	17. 3	18.11	19.20	20.29	21.38	22.47	23.57	24.31	25. 6	25.41	26.16	26.51
29	17.13	18.22	19.32	20.41	21.51	23. 1	24.11	24.46	25.22	25.57	26.32	27. 7
30	17.23	18.34	19.44	20.54	22. 5	23.16	24.27	25. 2	25.38	26.13	26.49	27.25
31	17.34	18.45	19.57	21. 8	22.19	23.31	24.43	25.19	25.55	26.31	27. 7	27.43
32	17.46	18.58	20.10	21.22	22.35	23.47	25. 0	25.36	26.13	26.49	27.26	28. 3
33	17.59	19.11	20.24	21.37	22.51	24. 4	25.18	25.55	26.32	27. 9	27.46	28.23
34	18.11	19.25	20.39	21.53	23. 7	24.22	25.37	26.14	26.52	27.29	28. 7	28.45
35	18.25	19.40	20.55	22.10	23.25	24.41	25.57	26.35	27.13	27.51	28.29	29. 8
36	18.39	19.55	21.11	22.27	23.44	25. 1	26.18	26.56	27.35	28.14	28.53	29.32
37	18.55	20.11	21.28	22.46	24. 3	25.21	26.40	27.19	27.58	28.38	29.17	29.57
38	19.10	20.28	21.47	23. 5	24.24	25.43	27. 3	27.43	28.23	29. 3	29.44	30.24
39	19.27	20.46	22. 6	23.26	24.46	26. 7	27.28	28. 8	28.49	29.30	30.11	30.52
40	19.45	21. 5	22.26	23.47	25. 9	26.31	27.54	28.35	29.17	29.58	30.40	31.22
41	20. 3	21.25	22.48	24.10	25.33	26.57	28.21	29 .3	29.46	30.28	31.11	31.54
42	20.23	21.46	23.10	24.34	25.59	27.24	28.50	29.33	30.16	31. 0	31.43	32.27
43	20.44	22. 8	23.34	25.00	26.26	27.53	29.20	30. 5	30.49	31.33	32.18	33. 2
44	21. 5	22.32	23.59	25.26	26.55	28.23	29.53	30.38	31.23	32. 8	32.54	33.39
45	21.28	22.57	24.25	25.55	27.25	28.56	30.27	31.13	31.59	32.46	33.33	34.20
46	21.53	23.23	24.53	26.25	27.57	29.30	31. 3	31.51	32.38	33.26	34.14	35. 2
47	22.18	23.50	25.23	26.57	28.31	30. 6	31.42	32.30	33.19	34. 8	34.57	35.47
48	22.45	24.20	25.55	27.30	29. 7	30.44	32.23	33.13	34. 3	34.53	35.44	36.35
49	23.14	24.51	26.28	28. 6	29.45	31.25	33. 7	33.58	34.49	35.41	36.33	37.26
50	23.45	25.24	27. 3	28.44	30.26	32. 9	33.53	34.46	35.39	36.32	37.26	38.20
51	24.17	25.59	27.41	29.25	31. 9	32.55	34.43	35.37	36.32	37.27	38.23	39.19
52	24.52	26.36	28.21	30. 8	31.56	33.45	35.36	36.32	37.29	38.26	39.24	40.22
53	25.28	27.16	29. 4	30.54	32.45	34.38	36.33	37.31	38.30	39.29	40.29	41.30
54	26. 7	27.58	29.50	31.43	33.38	35.35	37.34	38.34	39.36	40.37	41.40	42.43
55	26.49	28.43	30.39	32.36	34.35	36.36	38.40	39.43	40.47	41.51	42.56	44. 3
56	27.34	29.32	31.31	33.33	35.36	37.42	39.51	40.57	42. 4	43.11	44.20	45.29
57	28.22	30.24	32.28	34.34	36.43	38.54	41. 9	42.18	43.27	44.38	45.50	47. 4
58	29.14	31.21	33.29	35.40	37.54	40.12	42.33	43.45	44.59	46.14	47.30	48.48
59	30.10	32.21	34.35	36.52	39.12	41.37	44. 6	45.22	46.40	47.59	49.21	50·44
60	31.10	33.27	35.47	38.10	40.38	43.10	45.47	47. 8	48.31	49.56	51.24	52.54
61	32.16	34.39	37. 5	39.36	42.11	44.52	47.40	49. 7	50.36	52. 7	53.42	55.20
62	33.27	35.57	38.31	41.10	43.54	46.46	49.46	51.19	52.56	54.36	56.20	58. 9
63	34.45	37.23	40. 5	42.54	45.49	48.53	52. 8	53.50	55.36	57.27	59.23	61.26
64	36.11	38.58	41.50	44.49	47.58	51.17	54.50	56.44	58.43	60.48	63. 2	65.27
65	37.46	40.43	43.46	46.59	50.23	54. 2	57.59	60. 8	62.25	64.53	67.36	70.39
66	39.31	42.40	45.57	49.27	53.10	57.14	61.46	64.18	67. 4	70.12	73.52	78.38

TABLE XIII. SEMIDIURNAL AND SEMINOCTURNAL ARCHES,

For finding the time of the rising and setting of the Sun, Moon, or Stars.

DECLINATION.

Lat	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	14°	15°	16°	Lat
°	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	h.m	°
1	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	6.01	1
3	6.00	6.00	6.01	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.03	6.03	6.03	6.03	6.03	3
5	6.00	6.01	6.01	6.01	6.02	6.02	6.02	6.03	6.03	6.04	6.04	6.04	6.05	6.05	6.05	6.06	5
7	6.00	6.01	6.01	6.02	6.02	6.03	6.03	6.04	6.04	6.05	6.05	6.06	6.06	6.07	6.08	6.08	7
9	6.01	6.01	6.02	6.03	6.03	6.04	6.04	6.05	6.06	6.06	6.07	6.08	6.08	6.09	6.10	6.10	9
11	6.01	6.02	6.02	6.03	6.04	6.05	6.05	6.06	6.07	6.08	6.09	6.09	6.10	6.11	6.12	6.13	11
13	6.01	6.02	6.03	6.04	6.05	6.06	6.06	6.07	6.08	6.09	6.10	6.11	6.12	6.13	6.14	6.15	13
14	6.01	6.02	6.03	6.04	6.05	6.06	6.07	6.08	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	14
15	6.01	6.02	6.03	6.04	6.05	6.06	6.08	6.09	6.10	6.11	6.12	6.13	6.14	6.15	6.16	6.18	15
16	6.01	6.02	6.03	6.05	6.06	6.07	6.08	6.09	6.10	6.12	6.13	6.14	6.15	6.16	6.18	6.19	16
17	6.01	6.02	6.04	6.05	6.06	6.07	6.09	6.10	6.11	6.12	6.14	6.15	6.16	6.17	6.19	6.20	17
18	6.01	6.03	6.04	6.05	6.07	6.08	6.09	6.10	6.12	6.13	6.14	6.16	6.17	6.19	6.20	6.21	18
19	6.01	6.03	6.04	6.06	6.07	6.08	6.10	6.11	6.13	6.14	6.15	6.17	6.18	6.20	6.21	6.23	19
20	6.01	6.03	6.04	6.06	6.07	6.09	6.10	6.12	6.13	6.15	6.16	6.18	6.19	6.21	6.22	6.24	20
21	6.02	6.03	6.05	6.06	6.08	6.09	6.11	6.12	6.14	6.16	6.17	6.19	6.20	6.22	6.24	6.25	21
22	6.02	6.03	6.05	6.06	6.08	6.10	6.11	6.13	6.15	6.16	6.18	6.20	6.21	6.23	6.25	6.27	22
23	6.02	6.03	6.05	6.07	6.09	6.10	6.12	6.14	6.15	6.17	6.19	6.21	6.22	6.24	6.26	6.28	23
24	6.02	6.04	6.05	6.07	6.09	6.11	6.13	6.14	6.16	6.18	6.20	6.22	6.24	6.26	6.27	6.29	24
25	6.02	6.04	6.06	6.07	6.09	6.11	6.13	6.15	6.17	6.19	6.21	6.23	6.25	6.27	6.29	6.31	25
26	6.02	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.18	6.20	6.22	6.24	6.26	6.28	6.30	6.32	26
27	6.02	6.04	6.06	6.08	6.10	6.12	6.14	6.16	6.19	6.21	6.23	6.25	6.27	6.29	6.31	6.34	27
28	6.02	6.04	6.06	6.09	6.11	6.13	6.15	6.17	6.19	6.22	6.24	6.26	6.28	6.30	6.33	6.35	28
29	6.02	6.04	6.07	6.09	6.11	6.13	6.16	6.18	6.20	6.22	6.25	6.27	6.29	6.32	6.34	6·37	29
30	6.02	6.05	6.07	6.09	6.12	6.14	6.16	6.19	6.21	6.23	6.26	6.28	6.31	6.33	6.36	6.38	30
31	6.02	6.05	6.07	6.10	6.12	6.14	6.17	6.19	6.22	6.24	6.27	6.29	6.32	6.34	6.37	6.40	31
32	6.02	6.05	6.08	6.10	6.13	6.15	6.18	6.20	6.23	6.25	6.28	6.31	6.33	6.36	6.39	6.41	32
33	6.03	6.05	6.08	6.10	6.13	6.16	6.18	6.21	6.24	6.26	6.29	6.32	6.34	6.37	6.40	6.43	33
34	6.03	6.05	6.08	6.11	6.14	6.16	6.19	6.22	6.25	6.27	6.30	6.33	6.36	6.39	6.42	6.45	34
35	6.03	6.06	6.08	6.11	6.14	6.17	6.20	6.23	6.25	6.28	6.31	6.34	6.37	6.40	6.43	6.46	35
36	6.03	6.06	6.09	6.12	6.15	6.18	6.20	6.23	6.26	6.29	6.32	6.36	6.39	6.42	6.45	6.48	36
37	6.03	6.06	6.09	6.12	6.15	6.18	6.21	6.24	6.27	6.31	6.34	6.37	6.40	6.43	6.47	6.50	37
38	6.03	6.06	6.09	6.13	6.16	6.19	6.22	6.25	6.28	6.32	6.35	6.38	6.42	6.45	6.48	6.52	38
39	6.03	6.06	6.10	6.13	6.16	6.20	6.23	6.26	6.29	6.33	6.36	6.40	6.43	6.47	6.50	6.54	39
40	6.03	6.07	6.10	6.13	6.17	6.20	6.24	6.27	6.31	6.34	6.38	6.41	6.45	6.48	6.52	6.56	40
41	6.03	6.07	6.10	6.14	6.17	6.21	6.25	6.28	6.32	6.35	6.39	6.43	6.46	6.50	6.54	6.58	41
42	6.04	6.07	6.11	6.14	6.18	6.22	6.25	6.29	6.33	6.37	6.40	6.44	6.48	6.52	6.56	7.00	42
43	6.04	6.07	6.11	6.15	6.19	6.22	6.26	6.30	6.34	6.38	6.42	6.46	6.50	6.54	6.58	7.02	43
44	6.04	6.08	6.12	6.15	6.19	6.23	6.27	6.31	6.35	6.39	6.43	6.47	6.52	6.56	7.00	7.04	44
45	6.04	6.08	6.12	6.16	6.20	6.24	6.28	6.32	6.36	6.41	6.45	6.49	6.53	6.58	7.02	7.07	45
46	6.04	6.08	6.12	6.17	6.21	6.25	6.29	6.33	6.38	6.42	6.46	6.51	6.55	7.00	7.04	7.09	46
47	6.04	6.09	6.13	6.17	6.22	6.26	6.30	6.35	6.39	6.44	6.48	6.53	6.57	7.02	7.07	7.12	47
48	6.04	6.09	6.13	6.18	6.22	6.27	6.31	6.36	6.41	6.45	6.50	6.55	6.59	7.04	7.09	7.14	48
49	6.05	6.09	6.14	6.18	6.23	6.28	6.32	6.37	6.42	6.47	6.52	6.57	7.02	7.07	7.12	7.17	49
50	6.05	6.10	6.14	6.19	6.24	6.29	6.34	6.39	6.44	6.49	6.54	6.59	7.04	7.09	7.14	7.20	50
51	6.05	6.10	6.15	6.20	6.25	6.30	6.35	6.40	6.45	6.50	6.56	7.01	7.06	7.12	7.17	7.23	51
52	6.05	6.10	6.15	6.21	6.26	6.31	6.36	6.41	6.47	6.52	6.58	7.03	7.09	7.14	7.20	7.26	52
53	6.05	6.11	6.16	6.21	6.27	6.32	6.38	6.43	6.49	6.54	7.00	7.06	7.11	7.17	7.23	7.29	53
54	6.06	6.11	6.17	6.22	6.28	6.33	6.39	6.45	6.50	6.56	7.02	7.08	7.14	7.20	7.27	7.33	54
55	6.06	6.11	6.17	6.23	6.29	6.35	6.40	6.46	6.52	6.58	7.04	7.11	7.17	7.23	7.30	7.37	55
56	6.06	6.12	6.18	6.24	6.30	6.36	6.42	6.48	6.54	7.01	7.07	7.13	7.20	7.27	7.34	7.41	56
57	6.06	6.12	6.19	6.25	6.31	6.37	6.44	6.50	6.56	7.03	7.10	7.16	7.23	7.30	7.37	7.45	57
58	6.06	6.13	6.19	6.26	6.32	6.39	6.45	6.52	6.59	7.06	7.12	7.20	7.27	7.34	7.42	7.49	58
59	6.07	6.13	6.20	6.27	6.33	6.40	6.47	6.54	7.01	7.08	7.16	7.23	7.30	7.38	7.46	7.54	59
60	6.07	6.14	6.21	6.28	6.35	6.42	6.49	6.56	7.04	7.11	7.19	7.26	7.34	7.42	7.51	7.59	60
61	6.07	6.14	6.22	6.29	6.36	6.44	6.51	6.59	7.06	7.14	7.22	7.30	7.38	7.47	7.56	8.05	61
62	6.08	6.15	6.23	6.30	6.38	6.46	6.53	7.01	7.09	7.17	7.26	7.34	7.43	7.52	8.01	8.11	62
63	6.08	6.16	6.24	6.32	6.40	6.48	6.56	7.04	7.12	7.21	7.30	7.39	7.48	7.57	8.07	8.17	63
64	6.08	6.16	6.25	6.33	6.41	6.50	6.58	7.07	7.16	7.25	7.34	7.43	7.53	8.03	8.13	8.24	64
65	6.09	6.17	6.26	6.34	6.43	6.52	7.01	7.10	7.19	7.29	7.39	7.48	7.59	8.09	8.20	8.32	65
66	6.09	6.18	6.27	6.36	6.45	6·55	7.04	7.14	7.23	7.33	7.42	7.54	8.05	8.16	8.28	8.40	66

TABLE XIII. SEMIDIURNAL AND SEMINOCTURNAL ARCHES.

For finding the time of the rising and setting of the Sun, Moon, or Stars.

DECLINATION.

Lat	17°	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	30°	Lat
°	h.m	h.m	h.m	h.m	h.m	h.m.	h.m.	h.m.	h.m.	h.m.	h.m.	h.m.	h.m.	h.m.	°
1	6.01	6.01	6.01	6.01	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	6.02	1
3	6.04	6.04	6.04	6.04	6.05	6.05	6.05	6.05	6.06	6.06	6.06	6.06	6.07	6.07	3
5	6.06	6.07	6.07	6.07	6.08	6.08	6.09	6.09	6.09	6.10	6.10	6.11	6.11	6.12	5
7	6.09	6.09	6.10	6.10	6.11	6.11	6.12	6.13	6.13	6.14	6.14	6.15	6.16	6.16	7
9	6.11	6.12	6.13	6.13	6.14	6.15	6.15	6.16	6.17	6.18	6.19	6.19	6.20	6.21	9
11	6.14	6.14	6.15	6.16	6.17	6.18	6.19	6.20	6.21	6.22	6.23	6.24	6.25	6.26	11
13	6.16	6.17	6.18	6.19	6.20	6.21	6.22	6.24	6.25	6.26	6.27	6.28	6.29	6.31	13
14	6.17	6.19	6.20	6.21	6.22	6.23	6.24	6.25	6.27	6.28	6.29	6.30	6.32	6.33	14
15	6.19	6.20	6.21	6.22	6.24	6.25	6.26	6.27	6.29	6.30	6.31	6.33	6.34	6.36	15
16	6.20	6.21	6.23	6.24	6.25	6.27	6.28	6.29	6.31	6.32	6.34	6.35	6.37	6.38	16
17	6.21	6.23	6.24	6.26	6.27	6.28	6.30	6.31	6.33	6.34	6.36	6.37	6.39	6.41	17
18	6.23	6.24	6.26	6.27	6.29	6.30	6.32	6.33	6.35	6.36	6.38	6.40	6.41	6.43	18
19	6.24	6.26	6.27	6.29	6.30	6.32	6.34	6.35	6.37	6.39	6.40	6.42	6.44	6.46	19
20	6.26	6.27	6.29	6.30	6.32	6.34	6.36	6.37	6.39	6.41	6.43	6.45	6.47	6.49	20
21	6.27	6.29	6.30	6.32	6.34	6.36	6.38	6.39	6.41	6.43	6.45	6.47	6.49	6.51	21
22	6.28	6.30	6.32	6.34	6.36	6.38	6.39	6.41	6.43	6.45	6.48	6.50	6.52	6.54	22
23	6.30	6.32	6.34	6.36	6.38	6.39	6.42	6.44	6.46	6.48	6.50	6.52	6.54	6.57	23
24	6.31	6.33	6.35	6.37	6.39	6.41	6.44	6.46	6.48	6.50	6.52	6.55	6.57	7.00	24
25	6.33	6.35	6.37	6.39	6.41	6.43	6.46	6.48	6.50	6.53	6.55	6.57	7.00	7.02	25
26	6.34	6.36	6.39	6.41	6.43	6.45	6.48	6.50	7.53	6.55	6.58	7.00	7.03	7.05	26
27	6.36	6.38	6.40	6.43	6.45	6.48	6.50	6.52	6.55	6.58	7.00	7.03	7.06	7.08	27
28	6.37	6.40	6.42	6.45	6.47	6.50	6.52	6.55	6.57	7.00	7.03	7.06	7.09	7.11	28
29	6.39	6.42	6.44	6.47	6.49	6.52	6.54	6.57	7.00	7.03	7.06	7.09	7.12	7.15	29
30	6.41	6.43	6.46	6.49	6.51	6.54	6.57	7.00	7.02	7.05	7.08	7.11	7.15	7.18	30
31	6.42	6.45	6.48	6.51	6.53	6.56	6.59	7.02	7.05	7.08	7.11	7.14	7.18	7.21	31
32	6.44	6.47	6.50	6.53	6.56	6.58	7.01	7.05	7.08	7.11	7.14	7.18	7.21	7.25	32
33	6.46	6.49	6.52	6.55	6.58	7.01	7.04	7.07	7.11	7.14	7.17	7.21	7.24	7.28	33
34	6.48	6.51	6.54	6.57	7.00	7.03	7.07	7.10	7.13	7.17	7.20	7.24	7.28	7.32	34
35	6.49	6.53	6.56	6.59	7.02	7.06	7.09	7.13	7.16	7.20	7.24	7.27	7.31	7.35	35
36	6.51	6.55	6.58	7.01	7.05	7.08	7.12	7.16	7.19	7.23	7.27	7.31	7.35	7.39	36
37	6.53	6.57	7.00	7.04	7.07	7.11	7.15	7.18	7.22	7.26	7.30	7.34	7.39	7.43	37
38	6.55	6.59	7.02	7.06	7.10	7.14	7.17	7.21	7.25	7.30	7.34	7.38	7.43	7.47	38
39	6.57	7.01	7.05	7.09	7.12	7.16	7.20	7.25	7.29	7.33	7.37	7.42	7.47	7.51	39
40	6.59	7.03	7.07	7.11	7.15	7.19	7.23	7.28	7.32	7.37	7.41	7.46	7.51	7.56	40
41	7.02	7.06	7.10	7.14	7.18	7.22	7.27	7.31	7.36	7.40	7.45	7.50	7.55	8.00	41
42	7.04	7.08	7.12	7.17	7.21	7.25	7.30	7.35	7.39	7.44	7.49	7.55	8.00	8.05	42
43	7.06	7.11	7.15	7.19	7.24	7.29	7.33	7.38	7.43	7.48	7.53	7.59	8.04	8.10	43
44	7.09	7.13	7.18	7.22	7.27	7.32	7.37	7.42	7.47	7.52	7.58	8.04	8.09	8.16	44
45	7.11	7.16	7.21	7.25	7.30	7.35	7.40	7.46	7.51	7.57	8.03	8.08	8.15	8.21	45
46	7.14	7.19	7.24	7.29	7.34	7.39	7.44	7.50	7.55	8.01	8.07	8.14	8.20	8.27	46
47	7.17	7.22	7.27	7.32	7.37	7.43	7.48	7.54	8.00	8.06	8.12	8.19	8.26	8.33	47
48	7.19	7.25	7.30	7.35	7.41	7.47	7.53	7.59	8.05	8.11	8.18	8.25	8.32	8.40	48
49	7.22	7.28	7.33	7.39	7.45	7.51	7.57	8.03	8.10	8.17	8.24	8.31	8.38	8.46	49
50	7.25	7.31	7.37	7.43	7.49	7.55	8.02	8.08	8.15	8.22	8.30	8.37	8.45	8.54	50
51	7.29	7.35	7.41	7.47	7.53	8.00	8.06	8.13	8.21	8.28	8.36	8.44	8.53	9.02	51
52	7.32	7.38	7.45	7.51	7.58	8.05	8.12	8.19	8.27	8.35	8.43	8.52	9.01	9.11	52
53	7.36	7.42	7.49	7.56	8.02	8.10	8.17	8.25	8.33	8.41	8.50	9.00	9.09	9.20	53
54	7.40	7.46	7.53	8.00	8.08	8.15	8.23	8.31	8.40	8.49	8.58	9.08	9.19	9.30	54
55	7.44	7.51	7.58	8.05	8.13	8.21	8.29	8.38	8.47	8.57	9.07	9.18	9.29	9.42	55
56	7.48	7.55	8.03	8.11	8.19	8.27	8.36	8.45	8.55	9.05	9.16	9.28	9.41	9.55	56
57	7.52	8.00	8.08	8.16	8.25	8.34	8.43	8.53	9.04	9.15	9.27	9.40	9.54	10.11	57
58	7.57	8.05	8.14	8.22	8.32	8.41	8.51	9.02	9.13	9.25	9.38	9.53	10.10	10.30	58
59	8.02	8.11	8.20	8.29	8.39	8.49	9.00	9.11	9.24	9.37	9.52	10.09	10.29	10.56	59
60	8.08	8.17	8.26	8.36	8.47	8.58	9.09	9.22	9.35	9.51	10.08	10.28	10.55	12.00	60
61	8.14	8.24	8.34	8.44	8.55	9.07	9.20	9.34	9.49	10.07	10.27	10.54	12.00		61
62	8.20	8.31	8.42	8.53	9.05	9.18	9.32	9.47	10.05	10.26	10.54	12.00			62
63	8.27	8.38	8.50	9.02	9.16	9.30	9.46	10.04	10.25	10.53	12.00				63
64	8.35	8.47	9.00	9.13	9.28	9.44	10.02	10.24	10.52	12.00					64
65	8.44	8.57	9.10	9.25	9.42	10.00	10.22	10.51	12.00						65
66	8.53	9.07	9.23	9.39	9.58	10.21	10.50	12.00							66

TABLE XIV.

For reducing the time of the Moon's passage over the Meridian of Greenwich, to the time of its passage over any other Meridian.

Long.	Daily variation of the Moon's passing the Meridian.														Time fr. Moon's Southing
	40m	42 m	44m	46m	48m	50m	52m	54m	56m	58m	60m	62m	64m	66m	
°	m	m	m	m	m	m	m	m	m	m	m	m	m	m	h. m.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 20
10	1	1	1	1	1	1	1	1	2	2	2	2	2	2	0 40
15	2	2	2	2	2	2	2	2	2	2	2	3	3	3	1 0
20	2	2	2	3	3	3	3	3	3	3	3	3	4	4	1 20
25	3	3	3	3	3	3	4	4	4	4	4	4	4	5	1 40
30	3	3	4	4	4	4	4	4	5	5	5	5	5	5	2 0
35	4	4	4	4	5	5	5	5	5	6	6	6	6	6	2 20
40	4	5	5	5	5	6	6	6	6	6	7	7	7	7	2 40
45	5	5	5	6	6	6	6	7	7	7	7	8	8	8	3 0
50	6	6	6	6	7	7	7	7	8	8	8	9	9	9	3 20
55	6	6	7	7	7	8	8	8	9	9	9	9	10	10	3 40
60	7	7	7	8	8	8	9	9	9	10	10	10	11	11	4 0
65	7	8	8	8	9	9	9	10	10	10	11	11	12	12	4 20
70	8	8	9	9	9	10	10	10	11	11	12	12	12	13	4 40
75	8	9	9	10	10	10	11	11	12	12	12	13	13	14	5 0
80	9	9	10	10	11	11	12	12	12	13	13	14	14	15	5 20
85	9	10	10	11	11	12	12	13	13	14	14	15	15	16	5 40
90	10	10	11	11	12	12	13	13	14	14	15	15	16	16	6 0
95	11	11	12	12	13	13	14	14	15	15	16	16	17	17	6 20
100	11	12	12	13	13	14	14	15	16	16	17	17	18	18	6 40
105	12	12	13	13	14	15	15	16	16	17	17	18	19	19	7 0
110	12	13	13	14	15	15	16	16	17	18	18	19	20	20	7 20
115	13	13	14	15	15	16	17	17	18	19	19	20	20	21	7 40
120	13	14	15	15	16	17	17	18	19	19	20	21	21	22	8 0
125	14	15	15	16	17	17	18	19	19	20	21	22	22	23	8 20
130	14	15	16	17	17	18	19	19	20	21	22	22	23	24	8 40
135	15	16	16	17	18	19	19	20	21	22	22	23	24	25	9 0
140	16	16	17	18	19	19	20	21	22	23	23	24	25	26	9 20
145	16	17	18	19	19	20	21	22	23	23	24	25	26	27	9 40
150	17	17	18	19	20	21	22	22	23	24	25	26	27	27	10 0
155	17	18	19	20	21	22	22	23	24	25	26	27	28	28	10 20
160	18	19	20	20	21	22	23	24	25	26	27	28	28	29	10 40
165	18	19	20	21	22	23	24	25	26	27	27	28	29	30	11 0
170	19	20	21	22	23	24	25	25	26	27	28	29	30	31	11 20
175	19	20	21	22	23	24	25	26	27	28	29	30	31	32	11 40
180	20	21	22	23	24	25	26	27	28	29	30	31	32	33	12 0

This Table is to be entered with the daily variation at the top, and the ship's Longitude in the left side column ; then the minutes, corresponding to these, being added to the time of the moon's passing the meridian of Greenwich, if the Longitude be West, or subtracted if it be East, the sum or remainder will be the time of her passing the meridian of the place you are in.

TABLE XV.

CORRECTION OF THE MOON'S APPARENT ALTITUDE FOR PARALLAX AND REFRACTION.

☽'s App. Alt.	Horizontal Parallax				☽'s Alt.	Horizontal Parallax			
	54′	57′	60′	61′		54′	57′	60′	61′
10°	48′	51′	54′	55′	50°	34′	36′	38′	38′
11	48	51	54	55	51	33	35	37	38
12	48	51	54	55	52	33	34	36	37
13	49	51	54	55	53	32	34	35	36
14	49	52	54	55	54	31	33	35	35
15	49	52	54	55	55	30	32	34	34
16	49	52	54	55	56	30	31	33	33
17	49	51	54	55	57	29	30	32	33
18	48	51	54	55	58	28	30	31	32
19	48	51	54	55	59	27	29	30	31
20	48	51	54	55	60	26	28	29	30
21	48	51	54	54	61	26	27	29	29
22	48	51	53	54	62	23	26	28	28
23	47	50	53	54	63	24	25	27	27
24	47	50	53	54	64	23	25	26	26
25	47	50	52	53	65	22	24	25	25
26	47	49	52	53	66	22	23	24	24
27	46	49	52	52	67	21	22	23	23
28	46	49	51	52	68	20	21	22	22
29	46	49	51	52	69	19	20	21	21
30	45	48	50	51	70	18	19	20	21
31	45	47	50	51	71	17	18	19	20
32	44	47	49	50	72	16	17	18	19
33	44	46	49	50	73	16	16	17	18
34	43	46	48	49	74	15	15	16	17
35	43	45	48	49	75	14	14	15	16
36	42	45	47	48	76	13	14	14	15
37	42	44	47	47	77	12	13	13	14
38	41	44	46	47	78	11	12	12	12
39	41	43	45	46	79	10	11	11	11
40	40	43	45	46	80	9	10	10	10
41	40	42	44	45	81	8	9	9	9
42	39	41	44	44	82	7	8	8	8
43	38	41	43	44	83	6	7	7	7
44	38	40	42	43	84	6	6	6	6
45	37	39	41	42	85	5	5	5	5
46	36	39	41	41	86	4	4	4	4
47	36	38	40	41	87	3	3	3	3
48	35	37	40	41	88	2	2	2	2
49	35	37	39	40	89	1	1	1	1

This Table contains the correction to be added to the Moon's apparent altitude, in order to obtain the true, being the parallax in altitude, lessened by refraction; the former of which makes the Moon appear lower, and the latter makes her appear higher than her true place. This correction is likewise used in reducing the Moon's apparent distance from the Sun or a Star, to the true distance.

The Table is to be entered with the Moon's apparent altitude, in the left side column, and the minutes of horizontal parallax at the top—under which at the point of intersection will be the Moon's altitude, nearly correct.

TABLE XVI.

FOR REDUCING THE MOON'S DECLINATION,

As given in the Nautical Almanac for Noon and Midnight at Greenwich, to any other time under any other Meridian.

Var. of declin. in 12 h.	Hours from Noon or Midnight											For Minutes			
	1	2	3	4	5	6	7	8	9	10	11	m	m	m	m
	13	14	15	16	17	18	19	20	21	22	23	12	24	36	48
° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	′	′	′	′
0 5	0 0	0 1	0 1	0 2	0 2	0 2	0 3	0 3	0 4	0 4	0 5	0	0	0	0
0 10	0 1	0 2	0 2	0 3	0 4	0 5	0 6	0 7	0 7	0 8	0 9	0	0	0	1
0 15	0 1	0 2	0 4	0 5	0 6	0 7	0 9	0 10	0 11	0 12	0 14	0	0	1	1
0 20	0 2	0 3	0 5	0 7	0 8	0 10	0 12	0 13	0 15	0 17	0 18	0	1	1	1
0 25	0 2	0 4	0 6	0 8	0 10	0 12	0 15	0 17	0 19	0 21	0 23	0	1	1	2
0 30	0 2	0 5	0 7	0 10	0 12	0 15	0 17	0 20	0 22	0 25	0 27	0	1	1	2
0 35	0 3	0 6	0 9	0 12	0 15	0 17	0 20	0 23	0 26	0 29	0 32	1	1	2	2
0 40	0 3	0 7	0 10	0 13	0 17	0 20	0 23	0 27	0 30	0 33	0 37	1	1	2	3
0 45	0 4	0 7	0 11	0 15	0 19	0 22	0 26	0 30	0 34	0 37	0 41	1	1	2	3
0 50	0 4	0 8	0 12	0 17	0 21	0 25	0 29	0 33	0 37	0 42	0 46	1	2	2	3
0 55	0 5	0 9	0 14	0 18	0 23	0 27	0 32	0 37	0 41	0 46	0 51	1	2	3	4
1 0	0 5	0 10	0 15	0 20	0 25	0 30	0 35	0 40	0 45	0 50	0 55	1	2	3	4
1 5	0 5	0 11	0 16	0 22	0 27	0 32	0 38	0 43	0 49	0 54	1 0	1	2	3	4
1 10	0 6	0 12	0 17	0 23	0 29	0 35	0 41	0 47	0 52	0 58	1 4	1	2	3	5
1 15	0 6	0 12	0 19	0 25	0 31	0 37	0 44	0 50	0 56	1 2	1 9	1	2	4	5
1 20	0 7	0 13	0 20	0 27	0 33	0 40	0 47	0 53	1 0	1 7	1 13	1	3	4	5
1 25	0 7	0 14	0 21	0 28	0 35	0 42	0 50	0 57	1 4	1 11	1 18	1	3	4	6
1 30	0 7	0 15	0 22	0 30	0 37	0 45	0 52	1 0	1 7	1 15	1 22	1	3	4	6
1 35	0 8	0 16	0 24	0 32	0 40	0 47	0 55	1 3	1 11	1 19	1 27	2	3	5	6
1 40	0 8	0 17	0 25	0 33	0 42	0 50	0 58	1 7	1 15	1 23	1 32	2	3	5	7
1 45	0 9	0 17	0 26	0 35	0 44	0 52	1 1	1 10	1 19	1 27	1 36	2	3	5	7
1 50	0 9	0 18	0 27	0 37	0 46	0 55	1 4	1 13	1 22	1 32	1 42	2	4	5	7
1 55	0 10	0 19	0 29	0 38	0 48	0 57	1 7	1 17	1 26	1 36	1 45	2	4	6	8
2 0	0 10	0 20	0 30	0 40	0 50	1 0	1 10	1 20	1 30	1 40	1 50	2	4	6	8
2 5	0 10	0 21	0 31	0 42	0 52	1 2	1 13	1 23	1 34	1 44	1 55	2	4	6	8
2 10	0 11	0 22	0 32	0 43	0 54	1 5	1 16	1 27	1 37	1 48	1 59	2	4	6	9
2 15	0 11	0 22	0 34	0 45	0 56	1 7	1 19	1 30	1 41	1 52	2 4	2	4	7	9
2 20	0 12	0 23	0 35	0 47	0 58	1 10	1 22	1 33	1 45	1 57	2 8	2	5	7	9
2 25	0 12	0 24	0 36	0 48	1 0	1 12	1 25	1 37	1 49	2 1	2 13	2	5	7	10
2 30	0 12	0 25	0 37	0 50	1 2	1 15	1 27	1 40	1 52	2 5	2 17	2	5	7	10
2 35	0 13	0 26	0 39	0 52	1 5	1 17	1 30	1 43	1 56	2 9	2 22	3	5	8	10
2 40	0 13	0 27	0 40	0 53	1 7	1 20	1 33	1 47	2 0	2 13	2 27	3	5	8	11
2 45	0 14	0 27	0 41	0 55	1 9	1 22	1 36	1 50	2 4	2 17	2 31	3	5	8	11
2 50	0 14	0 28	0 42	0 57	1 11	1 25	1 39	1 53	2 7	2 22	2 36	3	6	8	11
2 55	0 15	0 29	0 44	0 58	1 13	1 27	1 42	1 57	2 11	2 26	2 40	3	6	9	12
3 0	0 15	0 30	0 45	1 0	1 15	1 30	1 45	2 0	2 15	2 30	2 45	3	6	9	12
3 5	0 15	0 31	0 46	1 2	1 17	1 32	1 48	2 3	2 19	2 34	2 50	3	6	9	12
3 10	0 16	0 32	0 47	1 3	1 19	1 35	1 51	2 7	2 22	2 38	2 54	3	6	9	13
3 15	0 16	0 32	0 49	1 5	1 21	1 37	1 54	2 10	2 26	2 42	2 59	3	6	10	13
3 20	0 17	0 33	0 50	1 7	1 23	1 40	1 57	2 13	2 30	2 47	3 3	3	7	10	13
3 25	0 17	0 34	0 51	1 8	1 25	1 42	2 0	2 17	2 34	2 51	3 8	3	7	10	14
3 30	0 17	0 35	0 52	1 10	1 27	1 45	2 2	2 20	2 37	2 55	3 12	3	7	10	14
3 35	0 18	0 36	0 54	1 12	1 30	1 47	2 5	2 23	2 41	2 59	3 17	4	7	11	14
3 40	0 18	0 37	0 55	1 13	1 32	1 50	2 8	2 27	2 45	3 3	3 22	4	7	11	15
3 45	0 19	0 37	0 56	1 15	1 34	1 52	2 11	2 30	2 49	3 7	3 26	4	7	11	15

TABLE XVII.

FOR REDUCING LONGITUDE INTO TIME, AND THE CONTRARY.

°	h. m.	°	h. m.	°	h. m.	°	h. m.	°	h. m.	°	h. m.
′	m. s.	′	m. s.	′	m. s.	′	m. s.	′	m. s.	′	m. s.
″	s. t.	″	s. t.	″	s. t.	″	s. t.	″	s. t.	″	s. t.
1	0 4	31	2 4	61	4 4	91	6 4	121	8 4	151	10 4
2	0 8	32	2 8	62	4 8	92	6 8	122	8 8	152	10 8
3	0 12	33	2 12	63	4 12	93	6 12	123	8 12	153	10 12
4	0 16	34	2 16	64	4 16	94	6 16	124	8 16	154	10 16
5	0 20	35	2 20	65	4 20	95	6 20	125	8 20	155	10 20
6	0 24	36	2 24	66	4 24	96	6 24	126	8 24	156	10 24
7	0 28	37	2 28	67	4 28	97	6 28	127	8 28	157	10 28
8	0 32	38	2 32	68	4 32	98	6 32	128	8 32	158	10 32
9	0 36	39	2 36	69	4 36	99	6 36	129	8 36	159	10 36
10	0 40	40	2 40	70	4 40	100	6 40	130	8 40	160	10 40
11	0 44	41	2 44	71	4 44	101	6 44	131	8 44	161	10 44
12	0 48	42	2 48	72	4 48	102	6 48	132	8 48	162	10 48
13	0 52	43	2 52	73	4 52	103	6 52	133	8 52	163	10 52
14	0 56	44	2 56	74	4 56	104	6 56	134	8 56	164	10 56
15	1 0	45	3 0	75	5 0	105	7 0	135	9 0	165	11 0
16	1 4	46	3 4	76	5 4	106	7 4	136	9 4	166	11 4
17	1 8	47	3 8	77	5 8	107	7 8	137	9 8	167	11 8
18	1 12	48	3 12	78	5 12	108	7 12	138	9 12	168	11 12
19	1 16	49	3 16	79	5 16	109	7 16	139	9 16	169	11 16
20	1 20	50	3 20	80	5 20	110	7 20	140	9 20	170	11 20
21	1 24	51	3 24	81	5 24	111	7 24	141	9 24	171	11 24
22	1 28	52	3 28	82	5 28	112	7 28	142	9 28	172	11 28
23	1 32	53	3 32	83	5 32	113	7 32	143	9 32	173	11 32
24	1 36	54	3 36	84	5 36	114	7 36	144	9 36	174	11 36
25	1 40	55	3 40	85	5 40	115	7 40	145	9 40	175	11 40
26	1 44	56	3 44	86	5 44	116	7 44	146	9 44	176	11 44
27	1 48	57	3 48	87	5 48	117	7 48	147	9 48	177	11 48
28	1 52	58	3 52	88	5 52	118	7 52	148	9 52	178	11 52
29	1 56	59	3 56	89	5 56	119	7 56	149	9 56	179	11 56
30	2 0	60	4 00	90	6 0	120	8 0	150	10 0	180	12 0

TABLE XVIII

FOR FINDING THE DISTANCE OF TERRESTIAL OBJECTS AT SEA.

Height in feet.	Dist M Dec	Height in feet.	Dist M.Dec	Height in feet	Dist. M.Dec	Height in feet	Dist. M Dec	Height in feet.	Dist. M.Dec	Height in feet	Dist. M Dec	Height in feet	Dist. M Dec
1	1.30	25	6.62	49	9.2	180	17.8	420	27.1	820	37.9	2500	66.2
2	1.86	26	6.76	50	9.3	190	18.2	430	27.4	840	38.3	2600	67.6
3	2.28	27	6.89	55	9.8	200	18.7	440	27.7	860	38.9	2700	68.7
4	2.66	28	7.01	60	10.2	210	19.2	450	28.1	880	39.2	2800	70.1
5	2.95	29	7.13	65	10.7	220	19.6	460	28.4	900	39.7	2900	71.3
6	3.25	30	7.26	70	11.0	239	20.0	470	28.7	920	40.1	3000	72.5
7	3.50	31	7.38	75	11.5	240	20.5	480	29.0	940	40.6	3100	73.7
8	3.74	32	7.49	80	11.8	250	20.9	490	29.3	960	41.0	3200	75.0
9	3.96	33	7.61	85	12.2	260	21.3	500	29.6	980	41.4	3300	76.1
10	4.19	34	7.72	90	12.6	270	21.7	520	30.1	1000	41.9	3400	77.0
11	4.40	35	7.84	95	12.9	280	22.2	540	30.7	1100	43.0	3500	78.4
12	4.59	36	7.95	100	13.2	290	22.5	560	31.3	1200	45.9	3600	79.5
13	4.76	37	8.07	105	13.6	300	22.9	580	31.9	1300	47.8	3700	80.5
14	4.95	38	8.17	110	13.9	310	23.3	600	32.4	1400	49.5	3800	81.7
15	5.13	39	8.29	115	14.2	320	23.7	620	32.9	1500	51.3	3900	82.7
16	5.30	40	8.39	120	14.5	330	24.0	640	33.5	1600	53.0	4000	83.6
17	5.46	41	8.49	125	14.8	340	24.4	660	34.0	1700	54.5	4100	84.6
18	5.62	42	8.58	130	15.1	350	24.7	680	34.5	1800	56.0	4200	85.7
19	5.78	43	8.69	135	15.4	360	25.1	700	35.0	1900	57.8	4300	86.7
20	5.94	44	8.79	140	15.6	370	25.4	720	35.5	2000	59.3	4400	87.8
21	6.07	45	8.89	145	15.9	380	25.8	740	36.0	2100	60.7	4500	88.7
22	6.23	46	8.99	150	16.2	390	26.1	760	36.5	2200	62.0	4700	90.7
23	6.34	47	9.08	160	16.7	400	26.5	780	37.0	2300	63.5	5000	93.7
24	6.49	48	9.19	170	17.2	410	26.8	800	37.4	2400	64.9	1.Mile	96.0

TABLE XIX.

LATITUDES AND LONGITUDES

OF THE PRINCIPAL

PORTS, HARBOURS, CAPES, SHOALS, ROCKS, &c.

IN

THE WORLD;

Deduced from the Observations of the most celebrated Astronomers and Navigators.

The Longitudes are reckoned from the Meridian of Greenwich Observatory

COASTS OF AMERICA, AND ISLANDS ADJACENT.

Spitsbergen.

Names of Places.	Latitude D. M.	Long. D. M.
Verleegen Hook	80 08N.	17 00E.
Smeerenburg Harbor	79 45	10 00
Amsterdam Island — Hackluyt's Head	79 46	10 00
Fair Foreland	78 54	8 50
South Cape	76 32	13 50
Hope Island	76 30	20 32
Bear Island	75 02	14 50

Iceland.

Grim's Island	67 00N.	21 46W.
Rikefiord	67 00	17 35
Cape North	66 34	23 10
Straumness	65 40	24 30
Patrixford	65 36	24 09
Reikianess Cape	63 55	22 45
Westman's Island	63 02	21 09
Longnose	66 45	12 19
Blaaness	66 02	12 21
Enchuisen Island	65 00	10 05
Englehoast	64 32	12 19
Wreeland Island	64 05	13 19
Cape Hekla	63 22	16 54

Greenland.

Gael Hamkes Bay	75 00N.	6 51W.
Bontokoe Island	73 27	9 36
John Mayen's Island	71 10	9 50
Cham Point	70 05	22 23
Dangy Island	67 23	27 25
Herjois Ness	65 03	30 25
Whales Island	62 30	39 09
Cape Desolation	62 00	46 12
Cape Discord	60 51	40 00
Cape Prince Christian	59 55	41 35
Cape Farewell	59 38	42 44

Davis' Straits.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Resolution	62 40N	46 43W.
Cape Comfort	62 45	47 35
Hope Harbor	63 55	47 55
Gilbert's Sound	64 15	47 58
Cooken Sound	64 50	48 03
K. Christian River	66 07	47 13
Moschetto Cove	64 55	52 56
Romel Fort	67 22	45 58
Disco. Is. S.W. Point	69 06	44 43
Waygate Island	70 40	44 13
James I. Cape Bedford	68 30	50 12
Cumberland Is. S. Point	66 00	60 35
Cape Walsingham	66 00	60 00
Bay of Good Fortune	64 20	61 34
Resolution Island	62 05	64 35
Cape Warwick	61 04	64 35

Hudson's Bay.

Button's Islands	60 47N.	65 21W.
Lowe's Savage I.	61 48	66 25
Terra Nieva	62 04	68 05
Saddle Back Island	62 10	68 15
Great Bear Island	54 04	80 01
Ice Cove	62 00	69 05
Baker's Dozen	57 00	80 00
Great Savage Island	62 25	70 05
North Bluff	62 26	71 15
God's Mercies	62 28	70 52
Salisbury Island	63 30	76 55
Nottingham, East end	63 35	76 50
Cape Charles, East end	62 50	74 20
——— West end	62 40	76 05
Cape Diggs	62 45	78 53
Mansfield, North end	62 40	78 05
——— South end	61 35	81 35
Sleeper's Island	60 10	81 35
Cape Pembroke	62 57	82 15
Large Swan's Nest	62 20	83 35

TABLE XIX. OF LATITUDES AND LONGITUDES.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Cape Southampton	62 10 N	86 15W.
Churchill River	58 47	94 12
Charton Island	52 03	79 10
Port Nelson's Shoals	57 35	92 35
Hay River	57 10	93 05
From Hudson's Bay to Quebeç.		
Black Head	59 50N.	63 37W.
False Black Head	59 20	69 19
Cardinal's Isles	58 50	63 00
Steal Point	58 07	61 50
East Island	57 45	61 20
Sadelle Islands	57 13	60 50
Enchanted Cape	56 40	60 55
St. Peter's Harbor	56 28	60 50
Cape Hamson	54 54	56 50
Great Bay of Esquimaux	54 20	57 35
Cape Charles	54 13	55 30
York Point	51 57	55 57
Red Bay	51 44	61 25
Black Bay	51 40	56 47
Red Cliffs	51 33	56 50
Forteau Bay	51 30	57 00
Grand Point	51 24	57 17
Esquimaux Bay	51 28	57 50
Haka Bay	50 52	59 07
Great Macatina Point	50 52	59 13
Little Macatina Isl.	50 38	59 32
Mount Joli	50 05	61 35
Esquimaux Islands	50 12	63 05
Mingan Island	50 16	63 20
Grand Bay St. John's	50 22	64 05
Seven Island Bay	50 07	65 50
Trinity Bay	49 37	66 32
St. Nicholas' Bay	49 28	67 05
Laval Bay	43 55	68 50
Bay of Rocks	48 05	68 43
St. Paul's Bay	47 30	69 15
Quebec	46 55	69 53
Newfoundland.		
Limits of the Great Bank of Newfoundland, N. Point	50 15N	50 00W.
Ditto, South Point	41 00	52 00
Outer, or False Bank	47 00	45 00
Virgin Rocks	46 30	51 35
Cape Race	46 42	52 49
Cape Ballard	46 49	52 42
Cape Broyle	47 07	52 35
Bay of Bulls	47 21	52 29
Cape Spear	47 30	52 20
St. John's Harbor	47 32	52 25
Cape St. Francis	47 54	52 30
Point of Grates	48 22	52 35
Trinity Bay	48 31	53 05
Cape Bonavista	48 53	52 40
Barrow Harbor	48 50	53 05
Funk Island	50 01	52 17
Cape Freels	49 34	53 00
Wadham Islands	49 54	53 30
Gander Bay	49 40N.	54 15W.
Fogo Island	50 00	53 54
Twillingate Islands	50 03	54 40
Bay of Notre Dame	50 00	55 35
Cape St. John	50 10	55 38
Horse Islands	50 22	56 51
White Bay	50 15	56 25
Hooping Harbor	50 46	56 18
Green Island	50 47	55 35
Groais Island	50 55	55 45
Hare Bay	51 15	56 01
St. Anthony's Cape	51 17	55 44
Quirpon Harbor	51 40	55 39
Belle Isle	51 55	55 30
Cape Norman	51 40	56 02
Bay St. Barbe	51 15	56 53
Point Ferolle	51 03	57 11
St. John's Island	50 50	57 23
Ingornachoix Bay	50 38	57 25
Bay St. Paul	49 51	57 55
Cape St. Gregory	49 22	58 17
South Head	49 08	58 26
Cape St. George	48 31	59 13
Cod Roy Island	47 52	59 23
Cape Ray	47 37	59 15
Great Barrisway	47 37	57 45
Burgeo Islands	47 35	57 37
Runney Island	47 32	57 30
Penguin's Islands	47 24	57 05
Fortune Bay	47 16	55 35
Burnet	47 16	56 01
Great Miquelon	46 55	56 21
Langley Island	46 42	56 20
St. Peter's Island	46 36	56 11
Cape Chapeau Rouge	46 52	55 22
Bay of Placentia	47 00	54 35
Cape St. Mary's	46 52	54 07
St. Mary's Bay	46 50	53 35
Cape Pine	46 40	53 20
Gulf of St. Lawrence.		
St. Paul's Island	47 11N.	60 00W.
Bird Islands	47 55	60 41
Brion Island	47 52	61 00
Magdalen Is. N.E. Pt.	47 41	61 00
———S. W. do.	47 12	61 41
Entry I.	47 15	61 21
Deadman's Island	47 15	61 53
I. of Antecosta, E. Pt.	49 09	61 39
———S. W. do.	49 22	63 23
———West do.	49 48	64 23
———North do.	49 53	64 00
I. de Bik, in the River St. Lawrence	48 32	67 55
Mount Camille	48 37	67 20
Cape St. Ann	49 03	66 55
Magdalen River	49 13	65 18
Cape Rozier	43 47	64 01
C. Gaspe and Bay	48 41	63 58
Flat Point	48 34	63 58
I. Bonaventure	48 24	63 58
Cape Despair	48 28	64 06
Miscou I. entrance of Chaleur Bay	48 00	64 21

TABLE XIX. Of Latitudes amd Longitudrs

Names of Places.	Lat. D. M.	Long. D. M.
P. Escuminac . .	47 02N.	64 42W.
St- John's I. N. C. .	47 02	63 54
———West Point	46 34	64 16
———East ditto .	46 27	61 53
———Bear Cape	46 00	62 18
Hilsborough Bay .	46 06	63 00
Cape St. George .	45 51	61 49
Gut of Canso, N. ent.	45 42	61 27
Justa Corp Island .	45 56	61 27
Port Hood . .	45 57	61 25
Cape North Island, off Cape Breton	47 01	60 15
Port Dauphin . .	46 23	60 18
Spanish Bay . .	46 18	60 02
Flint Island . .	46 12	59 38
Scatari Island . .	46 02	59 32
Cape Breton . .	45 58	59 44
Louisburg . .	45 54	59 54
C. Hinchinbroke .	45 34	60 29
Isle Madame . .	45 29	60 49
Gut of Canso, S. ent.	45 28	60 51
Chebucto Bay . .	45 23	60 51

From Cape Cansor, in Nova Scotia, to the River St. Croix.

Names of Places.	Lat. D. M.	Long. D. M.
*Cape Cansor . .	45 17N.	60 48W.
Port Howe . .	45 12	60 59
Torbay . . .	45 14	61 10
Saudwich Bay .	45 09	61 30
Port Stephen's .	45 01	61 52
Halifax Harbor .	44 37	63 24
Cape Sambro Light .	44 30	63 25
Charlotte Bay .	44 36	63 48
Port Jackson . .	44 12	64 22
Isle of Hope . .	43 53	64 40
Port Roseway .	43 40	65 12
Sable I. East Point .	44 04	59 53
———West do. .	44 04	60 25
Cape Sable . .	43 27	65 30
Seal Isles . .	43 26	65 54
Cape Forchu . .	43 51	66 02
St. Mary's . .	44 10	66 10
Brewer's Island .	44 20	66 20
Annapolis Royal .	44 47	65 48
Haut's Island . .	45 19	64 45
Cape Spencer . .	47 17	65 51
Mocgone's Island .	45 18	66 00
Campo Bello Isl. mid.	44 56	66 50
Wolves Island .	45 00	66 35
Grand Manan, E. end	44 46	66 36
———West do.	43 42	66 50
St. Croix River .	45 05	67 04

UNITED STATES OF AMERICA.

Names of Places.	Lat. D. M.	Long. D. M.
Machias River, ent.	44 43N.	67 15W.
Goldsboro' Harbor .	44 30	67 46
Mount Desert Rock	43 52	68 04
Isle of Holt . .	44 00	68 34
Penobscot . .	44 25	68 39
Martinicus Island .	43 50	68 50
Manheigin Island .	43 44	69 10
Bantam Ledges .	43 42	69 26
Kennebeck River, ent.	43 42N.	69 41W
Cush's Ledge . .	43 04	69 06
Alden's Ledge .	43 27	70 00
Portland Lighthouse	43 40	70 06
Cape Elizabeth .	43 33	70 05
Saco River, entrance	43 27	70 16
Wood Island Light .	43 27	70 14
Agamenticus Hill .	43 15	70 34
Wells Harbor . .	43 20	70 27
Cape Neddock Nubble	43 10	70 40
York River . .	43 06	70 31
Boon Island . .	43 07	70 26
———Ditto Ledge	43 04	70 20
Portsmouth Lighthouse (N. H.)	43 04	70 40
Isle of Shoals . .	42 56	70 33
Newburyport Lights, (Mass.) .	42 48	70 46
Ispwich entrance .	42 42	70 42
Cape Ann Lighthouse	42 41	70 30
Baker's Isl. Light	42 34	70 41
Salem . . .	42 33	70 47
Marblehead . .	42 31	70 50
Boston Lighthouse .	42 20	70 48
Boston . . .	42 23	71 04
Cambridge (Mass.) .	42 23	71 08
Plymouth Light .	41 58	70 24
Cape Cod Lighthouse	42 05	69 56
Sandy Point . .	41 35	69 53
Shoal of Georges .	41 46	67 45
Ditto . .	41 32	67 21
Nantucket Lighthouse	41 22	69 45
Sancoty Head . .	41 15	69 53
Nantucket S. Shoal .	40 42	69 50
Cape Page . .	41 27	70 20
Gay Head Lighthouse	41 21	70 50
Noman's Land .	41 13	70 43
New-Bedford . .	41 41	70 56
Buzzard's Bay, ent.	41 26	70 53
Newport entrance .	41 27	71 17
Rhode I. Lighthouse	41 29	71 26
Point Judith Light .	41 24	71 31
Block Island, middle	41 10	71 40
New-London Light	41 21	72 10
Gull Island Light .	41 15	72 44
New-Haven entrance	41 17	72 58
Montock Point (East end of L. I.) Light	41 04	71 57
East-Hampton; (L. I.)	41 01	72 16
New-York City .	40 41	74 01
New-York Lighthouse	40 28	74 01
Perth Amboy . .	40 29	74 32
Little Egg Harbor .	39 31	74 20
Great Egg Harbor .	39 18	74 20
Cape May . .	38 57	74 55
Philadelphia . .	39 57	75 04
Cape Henlopen .	38 47	75 04
Cape Charles . .	37 10	76 10
Cape Henry . .	36 58	76 17
Norfolk, (Vir.) .	36 54	76 6
Petersburg, (Vir.) .	37 11	77 53
York Town, (Vir.)	37 14	76 50
Richmond, (Vir.) .	37 28	77 52
Annapolis, (Md.) .	39 02	76 45
Alexandria, (Vir.) .	38 48	77 12

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* New Light on Cranberry Island, near C. Cansor, Lat. 45 20 Long. 60 40. To distinguish it from Sambro Light, a small light will also appear about 25 feet below the Lantern.

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat. D. M.	Long. D. M.
WASHINGTON CITY	38 52N.	77 10W.
Chincoteague Shoals	37 57	75 10
Baltimore . .	39 21	76 45
Roanoke Inlet . .	35 50	75 30
Cape Hatteras . .	35 12	75 26
Shoal off do. . .	35 02	75 02
Cedar Inlet . .	34 45	76 17
Cape Lookout .	34 32	76 30
Shoal off do. . .	34 20	76 25
Beaufort, (N.C.) .	34 40	76 40
Rogue Inlet . .	34 36	77 10
Swan's Borough, (N.C.)	34 40	77 10
Bear Inlet . .	34 35	77 16
Deep Inlet . .	34 15	77 53
Wilmington . .	34 16	78 02
Brunswick . .	34 02	78 04
New Inlet . .	33 54	78 10
Cape Fear . .	33 49	78 03
Fryingpan Shoals off do.	33 35	77 40
Georgetown, (S.C.)	33 25	78 56
Shoals off do. . .	33 11	78 36
Cape Roman . .	33 01	79 02
Charleston Light .	32 44	79 35
Beaufort, (S.C.) .	32 27	80 26
Port Royal, entrance	32 09	80 20
Tybee Light . .	32 00	80 40
Savannah, (Geo.) .	32 00	80 56
St. Catherine's Sound	31 36	81 10
St. Mary's River, ent.	30 46	81 50
Cumberland Island, S.P.	30 46	81 51
Amelia Island, (S.P.)	30 28	81 50
River St. John's, ent.	30 20	81 50
St. Augustine . .	29 50	81 35
Moschetto, ent. .	28 50	80 55
Cape Canaveral .	28 50	80 30
Breakers off do. .	28 20	80 07
Las Tortolas Hommock	27 34	80 26
Hillsborough Isle, N.P.	27 30	80 13
South Point .	27 15	80 10
Mount Pelado . .	27 00	80 05
Granville's Inlet .	26 48	79 56
Sand Hills . .	26 30	79 57
Middle River Inlet .	26 05	80 01
Cape Florida . .	25 40	80 02

Island of Bermudas.

Georgetown . .	32 25	64 40
Breakers . .	32 35	57 45

From Cape Florida to Cape Horn.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Florida . .	25 40N.	80 02W.
Dry Tortugas . .	24 30	83 14
Cape Sable . .	24 57	81 11
Cape Roman . .	26 00	81 45
Carlos Bay . .	26 39	82 44
Spiritu Santo Harbor	27 38	83 00
Bay of Apalache .	30 00	84 40
Cape St. Blas . .	29 43	85 57
Pensacola . .	30 25	87 21
Mobile Point . .	30 10	87 55
New-Orleans . .	29 58	89 52
River Mississippi, ent.	29 13N.	80 14W
River Bravo, ent. .	25 55	97 25
Cape Roxa . .	21 45	97 12
Mexico . . .	19 26	99 00
Vera Cruz . .	19 12	95 55
Campeeche . .	20 04	90 21
Brawles' Shoals .		86 54
Cape Catouch . .	21 25	86 54
Loggerhead Key .	21 35	86 49
False Cape . .	21 03	86 39
Consumel Is. S. Pt. .	19 50	86 44
N. Triangles, N. Pt.	19 01	87 18
South Point .	18 22	87 14
Glover's Reef, N. Pt.	16 44	87 25
Utila, E. Pt. . ,	16 00	87 00
Rattan Is. E. Pt. .	16 26	86 14
Bonacca Is. N.E. Pt.	16 33	86 16
Swan Islands . .	17 22	84 00
Cape Cameron .	16 02	85 05
Black River, ent. .	15 56	84 50
Cape Gracias a Dois	15 01	82 46
St. Andrew's Island	12 32	30 50
Corn I. N. End .	12 13	82 05
Porto Bello . .	09 33	79 50
Gulf of Darien, ent.	08 35	77 00
Carthagena . .	10 25	75 40
St. Martha . .	11 19	74 00
Cape de la Vela .	12 12	72 10
Monks Island . .	12 30	70 50
Cape Roman . .	12 10	70 00
Porto Cabello . .	10 31	68 05
Laguira . . .	10 37	66 52
Carraccas . .	10 31	66 50
Aves Island, S. Pt. .	11 57	67 20
Rocca Is. N.E. Pt. .	12 00	66 17
Orchilla Is. E. End .	11 51	65 37
Tortuga, E. End .	10 54	65 13
Blanca Is. N. Pt. .	11 56	64 36
Margarita Is. N.E. Pt.	11 10	63 53
River Oronoco, ent.	08 26	60 05
River Essequibo, ent.	07 00	58 30
River Surinam, ent.	06 00	55 12
Cayenne . . .	04 56	52 10
Cape North . .	01 55	50 10
River Amazon, ent.	00 18	50 35
St. Louis de Maranham	02 29S.	43 35
Cape St. Roque .	05 03	35 25
Pernambuco . .	08 12	35 05
Cape St. Augustine	08 25	35 28
River St. Francisco	10 57	36 50
St. Salvador . .	13 00	39 10
Porto Seguro . .	16 26	40 07
Abrolhos Islands .	17 58	39 33
Espiritu Santo . .	20 15	40 23
Cape St. Thomas .	21 48	40 55
Cape Frio . .	23 01	41 40
Rio Janeiro . .	22 54	43 05
Grand Island . .	23 18	44 00
Santos . . .	24 04	46 05
St. Catherine's I. N.Pt.	27 19	47 35
South Pt. . .	27 49	47 44
Porto St. Pedro .	32 10	52 00
Cape St. Mary's (N. ent. to R. Plate	34 56	54 42
Cape St. Anthony .	36 55	56 22

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat. D. M.	Long. D. M.
Buenos Ayres . .	34 36S.	58 19W
Cape Cordova . .	45 42	67 19
Cape Blanco . .	47 17	65 51
Port St. Julian .	49 07	67 33
Magellan's Straits .	52 25	68 20
Cape Good Success .	55 02	65 12
Cape St. Bartholomew	54 56	64 33
Cape St. John . .	54 47	63 36
Cape Horn . .	55 58	67 21

The West Coast of America, from Cape Horn to Behrings' Straits.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Horn . .	55 58S.	67 21W
Barnwell's Island .	55 49	66 52
Cape Diego . .	54 33	64 06
Conception Bay .	36 43	72 34
Juan Fernandez .	29 54	71 22
Arica . . .	18 29	71 05
Lima . . .	12 01	76 41
Gallapagos Isles .	23 30	85 00
Panama . .	08 48N.	80 15
Aquapulco . .	17 10	101 40
Cape Corientes .	22 20	107 00
California, S. Point .	23 30	109 30
Cape Lookout .	45 32	123 49
Cape Eitzburgh .	51 00	128 57
Cape St. James .	52 00	131 34
Cape Caldwell .	54 18	133 31
Cape Edgecombe .	57 03	135 47
St. George's Sound .	49 36	126 42
Prince William's do.	61 05	147 15
Cook's River . .	59 00	152 00
Cape Grenville .	57 30	153 00
Alatka, S. Point .	54 45	163 10
Shallow Water Point	63 00	162 45
Cape Stephens .	64 01	162 15
Norton Sound . .	64 15	162 00
Cape Rodney . .	64 35	164 24
Cape P. of Wales .	65 45	168 13

Islands in the West Indies.

Names of Places.	Lat. D. M.	Long. D. M.
Trinidad, N.E. Pt. .	10 45N.	60 36W
Tobago, N.E. Pt. .	11 29	59 57
S.W. do. .	11 05	60 49
Grenada, N.E. Pt. .	12 19	61 49
S.W. do. .	11 57	62 19
Grenada Bank, mid.	11 55	62 15
Barbadoes, S. Pt. .	13 01	59 45
E. do. .	13 08	59 37
Bridgetown .	13 05	59 40
N.W. Pt. . .	13 20	59 52
St. Vincent, N. Pt. .	13 12	61 16
S. do. .	13 04	61 15
St. Lucia, S. Pt. .	13 30	61 00
N. do. .	13 56	60 46
Martinico, S.E. Pt. .	14 24	60 57
Diamond do. .	14 24	61 01
Port Royal .	14 36	61 04
W. Point . .	14 25	61 14
N.E. do. . .	14 58	61 00
Dominica, S. Pt. .	15 15	61 20
N. do. . .	15 39	61 25
Marigalante, N.E. Pt.	16 04N.	61 00W
S.E. do. . .	15 53	60 59
Guadaloupe, S. Pt. .	15 54	61 43
North do. . .	16 30	61 42
Deseada, N.E. Pt. .	16 24	60 56
Antigua, E. Pt. .	17 03	61 45
Montserrat, N.E. Pt.	16 47	62 12
S.W. do. . .	16 40	62 15
Redondo Island .	17 00	62 20
Nevis . . .	17 10	62 28
St. Christophers, S.E.P	17 10	62 31
N.W. do. . .	17 26	62 42
St. Eustatia, the town	17 29	63 00
Saba . . .	17 39	63 08
Aves Island . .	15 43	63 35
Barbuda, S.E. part .	17 50	61 45
St. Bartholomew, E. Pt.	17 56	62 34
West do. . .	17 54	62 51
St. Martins, E. Pt. .	18 03	62 50
W. Point . .	18 40	63 07
Anguilla, N.E. Pt. .	18 22	62 46
S.W. do. . .	18 09	63 05
Prickly Pear . .	18 20	63 10
Sambrero . .	18 36	63 21
Anegado, E. Pt. .	18 36	63 59
West do. . .	18 46	64 11
St. Croix, E. Pt. .	17 46	63 40
West do. . .	17 44	63 45
Virgin Gordo, E. Pt.	18 28	64 00
Tortola, E. Pt. .	18 27	64 27
West do. . .	18 25	64 39
St. John's . .	18 22	64 40
St. Thomas . .	18 25	64 51
Porto Rico, N.E. Pt.	18 29	66 00
Lamona Island .	18 08	67 44

Hispaniola or St. Domingo.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Engauno .	18 37N.	63 17W
Saona I. E. Pt. . .	18 15	68 28
Allavella Rock off do.	17 29	71 15
Port au Prince . .	18 34	72 16
Cape Tiberon . .	18 20	74 26
Port St. Louis . .	18 19	73 15
Navaza I. . .	18 24	74 55
Cape Donna Maria .	18 38	74 22
Petit Grove . .	18 27	72 45
Cape Nicholas .	19 46	73 25
The Mole . .	19 49	73 25
Tortudas, E. Pt. .	20 02	72 32
West do. . .	20 05	72 54
Monte Christo .	19 56	71 39
Old Cape Francois .	19 40	69 50
Cape Samana . .	19 15	69 00
Cape Raphael . .	19 56	69 00

Island of Jamaica.

Names of Places.	Lat. D. M.	Long. D. M.
Morant, S.E. End .	17 58N	76 00W
Port Royal . .	18 00	76 50
Portland Point .	17 44	77 02
Pedro Bluffs . .	17 52	77 45
Black River . .	18 01	77 55
Savannah la Mar .	18 15	78 16

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat. D. M.	Long. D. M.
Negril Point	18 17N.	78 31W.
Montego Bay	18 30	78 02
St. Ann's Harbor	18 31	76 56
Portia Maria	18 32	76 35
Port Anthony	18 25	76 05

Islands and Shoals lying off Jamaica.

Names of Places.	Lat. D. M.	Long. D. M.
Morant Keys, E. Pt.	17 25N.	75 55W
West do.	17 27	75 48
Pedro Shoals, E. Pt.	17 20	77 01
Little Cayman, S.W.Pt.	19 34	80 00
Great Cayman, S.W.Pt.	19 18	81 08
Swan Island	17 22	84 00
Mysterioso Shoal	18 00	83 50
Dry Bank	18 36	73 15
Paracel Shoal	18 50	84 20

Island of Cuba.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Mayze	20 16N.	74 04W.
St. Jago	20 00	76 05
Cumberland Harbor	19 53	75 13
Cabo de Cruz	19 42	77 52
I. of Pines, S.W. Pt.	21 20	83 12
Cape Corientes	21 46	84 27
Middle C.	21 44	84 34
C. Antonio	21 54	85 00
Colorados Rocks, N. West Pt.	22 30	85 14
Havannah	23 12	82 12
Matanzas	23 11	81 19

Islands and Shoals North of Cuba and Jamaica.

Names of Places.	Lat. D. M.	Long. D. M.
East Reef	20 12N.	68 43W.
North Reef, S.E. Pt.	20 15	69 29
West do.	20 31	70 01
The Triangle	20 40	69 48
Square Handkerchief N.E. Pt.	21 19	70 20
S.W. do.	20 53	70 57
Grand Turk's I. N.E.P.	21 32	71 05
Sand Key	21 11	71 10
Great Caycos, S.Pt.	21 28	71 25
E. ditto.	21 43	71 26
N.W. do.	21 57	72 00
Heneaga, N.E. Pt.	21 20	72 59
West do.	21 00	73 00
Little Heneaga, W. Pt.	21 30	73 08
North do.	21 34	74 00
Hogsties, middle	21 41	73 50
Mayaguana, S. Pt.	22 20	72 33
North do.	22 29	72 53
S.W. do.	22 22	72 55
French Keys	22 42	73 27
Miraporvos Keys	22 07	74 18
Castle I. or S. Key	22 03	74 00
N. Key, Crooked I.	22 49	74 02
Atwood's Key, N.E.Pt.	23 03	73 25
Key Verde, S.W. do.	22 12	75 10
The Brothers	22 38	75 00

Names of Places.	Lat. D. M	Long. D M
Long I. S.E. Pt.	22 50N.	74 45W
North do.	23 30	75 28
*Rum Key	23 38	74 05
Walland I.	23 57	74 35
Little I. centre	24 04	74 30
Cat I. S. part	24 04	74 44
North do.	24 39	75 12
Exuma, E. do.	23 34	75 10
Powels Pt.	24 38	76 20
Egg I. or West part	25 35	77 10
New Providence, W.Pt.	24 59	77 35
Nassau	25 05	77 22
Andros I. S. Pt.	24 05	78 00
North Pt.	25 15	78 30
Hole in the Wall	25 54	77 10
Little Bank of Bahama, N.W. Pt.	27 45	79 44
Sand Key	26 53	79 14
Great Isaac	26 00	79 17
Little do.	26 05	79 11
Cat Keys Harbor	25 20	79 06
Orange Key	24 43	79 36
Double Headed Shot Keys, W. Pt.	24 00	80 10
Anguilla, E. part	23 27	79 14

COASTS OF GREAT BRITAIN, AND ISLANDS ADJACENT.

South Coast of England.

Names of Places.	Lat. D. M	Long. D M
London, (St Paul's)	51 31N.	00 06W.
Greenwich Obs.	51 29	00 00
Nore	51 28	00 46E.
North Foreland Light	51 23	01 26
Deal Castle	51 13	01 24
South Foreland Light	51 08	01 22
Dover Castle	51 08	01 19
Dungeness Light	50 55	00 58
Hastings	50 52	00 35
Beachy Head	50 44	00 15
Seaford	50 47	00 07
Brighton Church	50 50	00 12W.
Shoreham	50 50	00 16
Arundel	50 49	00 35
Owers Light	50 40	00 40
Selsey Bill	50 44	00 48
Portsmouth Church	50 47	01 06
Isle of Wight		
— Bembridge Point	50 41	01 04
— Princess Shoal, S.B.	50 39	01 04
— Dunnose Point	50 37	01 12
— St. Catherine's Tower	50 36	01 18
— Needle's Light	50 40	01 34
— Cowes	50 46	01 16
Hurst Light-house	50 42	01 33
Christ-Church Head	50 43	01 45
Branksea Castle (Pool)	50 41	01 57
St. Alban's Head	50 33	02 02
Weymouth	50 36	02 27
Shambles Shoal, mid.	50 32	02 22

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* Rum Key is placed erroneously in many charts. The above is correct. It is ten miles long, and three miles and three quarters wide.

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Portland Up. Light .	50 32N.	02 27W
Lyme Cob . .	50 43	02 55
Berry Head, F. S. .	50 24	03 28
Dartmouth . .	50 22	03 34
Start Point, F. S. .	50 13	03 38
Bolt Head, F. S. .	50 13	03 48
Rame Head . .	50 19	04 12
Plymouth, Old Church	50 22	04 08
Eddystone Light .	50 11	04 15
Deadman's Pt. F. S.	50 13	04 47
Pendennis Castle .	50 09	05 02
Blackhead, F. S. .	50 01	05 04
Lizard Point . .	49 58	05 12
Mount's B. (Penz.)	50 08	05 31
Runnel Stone . .	50 01	05 39
Wolf Rock . .	49 57	05 48
Land's End (Stone)	50 04	05 42
Longship's Light .	50 04	05 45
St. Martin's Day-mark	49 59	06 15
Scilly Isles, St. Agnes' Light .	49 54	06 19
Seven Stones . .	50 02	06 07

West Coast of England.

Names of Places.	Lat.	Long.
Cape Cornwall .	50 08N.	05 42W.
St. Ives Point . .	50 13	05 26
Cow and Calf . .	50 33	05 02
Port Isaac . .	50 36	04 46
Hartland Pt. . .	50 01	04 30
Barnstaple . .	50 07	04 03
Mort Pt. S. entrance of Bristol Channel	51 12	04 13
Lundy Island . .	51 10	04 38
Flatholm Light .	51 23	03 06
Bristol . . .	51 27	02 35
Ness Point . .	51 24	03 33
Mumble's Light .	51 34	03 57
Worm's Head . .	51 34	04 19
Caldy Island . .	51 38	04 40
St. Gowan's Point .	51 36	04 56
St. Ann's Light .	51 41	05 09
Small's Light . .	51 43	05 40
Hatts and Barrels .	51 43	05 34
St. David's Head .	51 54	05 17
Strumble's Head .	52 02	05 07
Dinas Point . .	52 02	04 53
Cardigan Island .	52 08	04 40
New Key Head .	52 15	04 19
Aberistwith . .	52 26	04 03
Aberdovey . .	52 33	04 00
Barmouth . .	52 43	04 00
Penkellan Head .	52 48	04 32
Bardsey Island S. Pt.	52 45	04 46
Porthdinlleyn Head	52 57	04 34
Holyhead Mountain	53 19	04 39
Skerries Light .	53 26	04 36
Point Linas Light .	53 25	04 16
Great Orms Head .	53 20	03 50
Point of Ayr Light .	53 21	03 19
Lake Light . .	53 24	03 10
Liverpool (St. Paul's)	53 25	02 59
Formby N.W. Landm.	53 33	03 05
Lancaster . .	54 03	02 48

Names of Places.	Lat.	Long.
	D. M.	D, M.
Selker Rock . .	54 17N.	03 57W
St. Bees Head Light	54 31	03 37
Whitehaven . .	54 33	03 35
Workington . .	54 38	03 34
Mary Port . .	54 43	03 27
Carlisle . . .	54 56	02 56
Isle of Man.		
—Calf of Man . .	54 02	04 50
—Point of Air .	54 25	04 22
—Ramsey . .	54 19	04 26
—Douglas . .	54 09	04 30

West and North Coast of Scotland.

Names of Places.	Lat.	Long.
Ross . . .	54 46N	04 08W
Burrow Head . .	54 42	04 27
Great Scar Island .	54 40	04 46
Mull of Galloway .	54 38	04 56
Port Patrick Light .	54 48	05 08
Elsa Island . .	55 16	05 12
Air Light-house .	55 26	04 44
Pladda Island Light	55 27	05 11
North Point Arran Isl.	55 40	05 20
Cumry Island Light	55 46	05 16
Greenock . . .	55 58	05 06
M. of Cantire Light	55 19	06 00
Gia-Island, North End	55 45	06 01
Run's Point, Ila Isl.	55 47	06 44
Touvore Head, Ditto	55 54	06 45
Skerryvore Rocks .	56 16	07 24
Duskier Rock . .	56 34	07 20
Tire-ey Isle, N. W. P.	56 33	07 16
Helsker Islands . .	56 56	06 59
Sunk Rocks to the west of Helsker	56 55	07 08
Coll Island, East End	56 41	06 43
Rum Island, East End	57 00	06 30
Cana Island, East Pt.	57 03	06 44
Donvegan Head .	57 30	07 04
Valernesh Point .	57 35	06 54
Rea Head . .	57 50	06 02
More Head . .	58 05	05 39
Stower Head . .	58 14	05 37
Cape Wrath . .	58 36	05 19
Rona Island . .	58 55	06 16
Bara, or Sulisker Isl.	58 54	06 28
Far-out Head . .	58 39	04 55
Dunnet Head . .	58 42	03 27
Duncansby Head .	58 40	03 08

Hebrides, or Lewis Islands.

Names of Places.	Lat.	Long.
Bernera Island .	56 48N.	07 56W
Grien Head, Bara Isl.	57 00	07 53
Ruardvula So. Ulst. I.	57 12	07 49
Hyskere Island, W. P.	57 29	08 00
Casamul Island .	57 34	08 00
Rennish Head . .	57 41	07 16
Toe Head . .	57 50	07 25
Glash Island Light .	57 50	06 56
Gallan Head . .	58 11	07 24
Flannen Isles . .	58 14	07 51
St. Kilda Isle . .	57 50	08 18

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Aird Point . .	58 15N.	06 24W.
Butt of the Lewis .	58 28	06 34

Orkney Isles.

Names of Places.	Lat. D. M.	Long. D. M.
Pentland Skerries .	58 42N.	03 02W
Stroma Island, S. End	58 43	03 14
South Ronoldsha, S. P.	58 45	03 04
Copinshaw . .	58 56	02 46
Stronsa Isl. Lamb H.	59 06	02 38
Tresness, Sanda Isle	59 15	
Start, Ditto . .	59 19	
North Ronoldsha Lt.	59 25	02 36
Mould Head, Pappa Westra Island	59 23	03 01
Noup Head, Westra Isle . .	59 20	03 09
Marwick.H. Pomona I.	59 06	03 22
Stromness, Pomona Isle . . .	58 58	03 28
Hoyhead Head, Hoywalls Island	58 57	03 22
The Stack . .	59 02	
Sule Skerry . .	59 03	
Fair Island . .	59 29	01 45

Shetland Isles.

Names of Places.	Lat. D. M.	Long. D. M.
Suenburgh Head .	59 52N.	01 25 W
Hang Cliff . .	60 07	00 50
Brassa Sound, Lerwick	60 10	00 53
Whalsey Island .	60 25	00 39
Unst Island, N.E. Pt.	60 42	00 00
Foul Island . .	60 25	01 20

Ferro Isles.

Names of Places.	Lat. D. M.	Long. D. M.
Monk Rock, which appears like a Sail	61 18N.	06 31W
Fugloe Island . .	62 14	06 10
Mygeness Island, E. P.	62 04	07 20

East Coast of Scotland and England.

Names of Places.	Lat. D. M.	Long. D. M.
Noss Head . .	58 32N.	03 08 W
Clythness . .	58 23	03 15
Ord Head . .	58 12	03 37
Tarbet Ness . .	57 56	03 49
Cromarty . .	57 42	04 01
Inverness . .	57 32	04 08
Fort George . .	57 38	04 06
Brugh Head . .	57 44	03 31
Kennaird's Head Lt.	57 42	02 00
Peter Head . .	57 32	01 47
Buchan Ness . .	57 29	01 47
New Aberdeen .	57 09	02 08
Montrose . .	56 43	02 28
Red Head . .	56 37	02 29
Arbroath . .	56 34	02 34
Bell Rocks Light .	56 26	02 24
Buttoness Light .	56 28	02 43
Dundee . . .	56 28	02 56
St. Andrews . .	56 21	02 47
Fife Ness . .	56 17N.	02 34W
No. Carr Rock .	56 16	02 37
May Island Light .	56 11	02 33
EDINBURGH .	55 57	03 13
Bass Rock . .	56 05	02 38
Dunbar . . .	56 01	02 29
St. Abbs Head . .	55 55	02 05
Berwick . . .	55 46	02 00
Rocky Bank, Mid. .	56 10	02 05
Holy Is. Castle F. S.	55 40	01 47
Bamburgh Cas. F. S.	55 37	01 42
Staple's Light	55 38	01 37
Fern Isl. Light	55 37	01 39
Coquet Is. Light .	55 20	01 31
Tynmouth Light .	55 01	01 24
Sunderland Light .	54 55	01 21
Hartle-pool . .	54 42	01 11
Stockton . . .	54 34	01 18
Whitby . . .	54 29	00 37
Scarborough . .	54 17	00 25
Filey Brig . .	54 13	00 18
Flamborough Head .	54 07	00 06
Spurn Light . .	53 37	00 08
Outer Dowsings, N.W. end	53 33	01 03
Haddock Bank. .	53 32	01 43
Shoal to the Westw. of Outer Dowsing	53 34	00 55
Dudgeon Light .	53 19	01 01
Inner Dowsing .	53 17	00 35
Cromer Bank . .	53 07	01 24
Lemon and Owers, M.	53 11	01 56
Sherringham Shoal .	53 01	01 10
Hasborough Sand S. Buoy	52 50	01 51
Hammond's Knowl .	52 51	01 56
Smith's Knowl .	52 54	02 15
The Ridge . .	52 48	02 02
Cromer Light . .	52 54	01 20
Yarmouth . .	52 37	01 44
Leostoff Light . .	52 29	01 46
Southwold . .	52 20	01 43
Albro' Napes . .	52 09	01 43
Orfordness . .	52 05	01 34
Kentish Knock .	51 42	01 36
North Foreland Light	51 23	01 26

West Coast of Ireland.

Names of Places.	Lat. D. M.	Long. D. M.
Cape Clear . .	51 25N.	09 25W
Fastnet Rock . .	51 17	09 31
Crookhaven . .	51 24	09 36
Mizen Head . . .	51 23	09 42
Bantry B. Sheeps H.	51 34	09 44
Grelagh Rocks .	51 33	10 03
Dursey Is. S.W. End	51 37	10 06
Bull Rock . .	51 39	10 10
Cod's Head . .	51 44	09 59
Hog Islands . .	51 50	10 08
Bolus Head . .	51 51	10 13
Skelling's Rock .	51 54	10 24
Lemon Rock . .	51 56	10 19
—Dunmore Head .	52 12	10 19
Foze Rock . .	52 08	10 29

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Latitude	Long.
	D. M.	D. M.
Ferriter's Island .	52 08N.	10 25W
Tiraght Rocks -	52 10	10 28
Great Blasket, W. End	52 10	10 23
Ennis Tuskar . .	52 14	10 24
Dunorling Head .	52 18	10 16
Brandon Head .	52 22	10 07
—Kerry Head .	52 30	09 56
—Loop Head Light	52 37	09 54
Limerick . . .	52 42	08 42
Ballard's Point .	52 42	09 54
Hag's Head . .	52 55	09 42
—Black Head . .	53 06	09 28
—Galway . .	53 15	09 11
N. Arran Isle, W. end	53 07	10 03
Skird Rocks . .	53 16	10 18
Sline Head . .	53 26	10 29
Shark Isle . .	53 37	10 36
Ennis Turk Island .	53 42	10 24
Clare Island, W. end	53 46	10 18
Achill Head . .	53 58	10 30
Black Rock . . .	54 05	10 35
Urris Head . .	54 20	10 18

North Coast of Ireland.

Names of Places.	Latitude	Long.
Kid Isles . .	54 22N.	10 08W
Three Tuns Rocks .	54 23	10 04
Down Patrick Head	54 21	09 36
Killala . . .	54 13	09 27
Sligo . . .	54 17	08 41
Wheaten Rock .	54 21	08 55
Donnegal . -	54 38	08 14
Tellen Head . .	54 41	08 58
Douras Head . .	54 51	08 42
Arranmore Is. N. end	55 06	08 36
Bloody Foreland .	55 10	08 17
Tory Island . .	55 18	08 11
Horn Head . .	55 14	07 57
Mull Oy . . .	55 17	
Bucan's Head . .	55 18	07 47
—Dunaff Head .	55 17	07 32
Mullin Head . .	55 24	07 24
Ennistrahul Rocks .	55 29	07 11
Colodah Head .	55 22	07 07
Inisbone Head .	55 17	06 54
Londonderry . .	55 01	07 16
Giant's Causeway .	55 17	06 25
Rachlin Is. W. end .	55 21	06 12
Fair Head . .	55 17	06 04
Tor Head . .	55 16	06 01

East Coast of Ireland.

Names of Places.	Latitude	Long.
Maid's Rocks . .	54 58N.	05 37W
Black Head . .	54 49	05 38
Carrickfergus . .	54 42	05 47
Belfast . . .	54 34	05 56
Mew Isle and Light	54 42	05 25
South Rock Light .	54 24	05 22
Dundrum . .	54 13	05 50
Newry, entrance .	54 00	06 03
Dundalk, entrance .	53 58	06 14
Clougher Head .	53 51	06 11
Drogheda Bar .	53 44	06 12

Names of Places.	Lat.	Long.
	D. M.	D. M.
St. Patrick's Island .	53 35N.	06 03W
Lambay Island .	53 30	06 00
Howth Head Light .	53 21	06 03
DUBLIN . .	53 22	06 15
Wicklow Light .	52 59	06 01
Arklow . . .	52 47	06 08
Glascarrick . .	52 39	06 10
Wexford, entrance .	52 21	06 19

South Coast of Ireland.

Names of Places.	Lat.	Long.
Carnsore Point .	52 10N.	06 17W
Tusker Rock . .	52 12	06 06
Saltees Rocks . .	52 05	06 35
Hook Light . .	52 04	06 55
Waterford . .	52 11	07 07
Tramore . . .	52 06	07 08
Dungarvon . .	52 04	07 37
Ardmore, or Ram Hd.	51 54	07 40
Yougball . .	51 55	07 48
Dog's Nose . .	51 46	08 15
Cork . . .	51 55	08 30
Kinsale, Old Head .	51 35	08 29
Seven Heads . .	51 32	08 39
Dundedy Head .	51 29	08 50
Ross . . .	51 33	08 56
Stags off Toe Head .	51 24	09 07
Baltimore Head .	51 23	09 17

Coast of HOLLAND and JUTLAND from Calais to the Scaw.

Names of Places.	Lat.	Long.
Calais . . .	50 58N.	01 51E.
Gravelines . .	50 59	02 10
Dunkirk . . .	51 02	02 22
Newport . . .	51 08	02 45
Ostend . . .	51 15	02 55
Antwerp . .	51 15	04 30
Walcheren Is. W. Pt.	51 32	03 24
Goree Island, N.W. Pt.	51 49	03 50
Schowen Isl. Light .	51 41	03 37
Burges . . .	51 13	03 13
North Gatt . .	51 54	04 05
Rotterdam . .	51 54	04 29
AMSTERDAM .	52 22	04 51
Texel, N. Point .	53 11	04 34
Bremen . . .	53 03	08 51
Hamburg . .	53 34	09 55
Elbe River, Red B.	53 59	08 21
Heligoland Light .	54 11	07 55
Holmen . . .	57 09	08 35
Robsnout . .	57 27	09 39
Scaw Light . .	57 44	10 38

Cattegat and Sound.

Names of Places.	Lat.	Long.
Paternosters . .	57 55N.	11 27E.
Marstrand Light .	57 54	11 35
Wingo Beacon .	57 39	11 37
Gottenburgh . .	57 42	11 59
Lessiou I. E. Point	57 19	11 10
West Point	57 15	10 50
Trindel Rock . .	57 19	11 07

TABLE XIX. OF LATITUDES AND LONGITUDES

Names of Places.	Lat.	Long.
	D. M.	D. M.
Grasholm	57 29N	10 36E.
Suitringen Shoal	57 00	10 29
Niddingen Light	57 18	11 55
Warberg	57 06	12 16
Rocky Shoal, Little M. Ground	56 57	12 00
Falkenburgh	56 54	12 29
Halmsted	56 40	12 52
Anholt Light	56 45	11 40
Waderoe I. West P.	56 28	12 33
Koll Light	56 19	12 28
Hisell Island	56 12	11 42
Stains Head	56 35	10 51
Chalk Ground Shoal	56 25	11 52
Navaren Shoal	56 23	11 00
Jesness Ground, Shoal	56 17	10 53
Hastens Ground, Ditto	56 15	11 10
Nackehovet Light	56 06	12 21
Cronenburgh Light	56 03	12 37
Elsineur	56 01	12 35
Huen I. North Point	55 55	12 40
Saltholm, North Point	55 41	12 48
Lansdscrone	55 52	12 51
COPENHAGEN	55 42	12 35
Falsterbro Light	55 21	12 48

BALTIC SEA.

Lubeck	53 51N.	10 47E.
Dars Head	54 28	12 36
Bornholm Lt. N.W Pt.	55 14	14 46
West Point	55 08	15 17
Dantzick Heel	54 38	18 40
Dantzick	54 22	18 39
Oland Lt. South Pt.	56 11	16 25
North Point	57 23	17 05
Gothland South Pt.	56 54	18 16
North Point	57 50	18 54
Faro I. N. E. Point	57 55	19 31
Goltske I.	58 16	19 21
STOCKHOLM	59 19	18 04
Bruster Ort. Light	54 52	19 54
Memel	55 41	21 01
Domesness Light	57 45	22 31
Runo Light	57 48	23 08
Riga	56 57	23 56
Swasverort Light	57 54	21 59

Gulf of Finland.

Abo	60 27N.	22 18E.
Dagerort Point	58 57	22 01
Odenholm Islands	59 19	23 21
Hango Island and Lt.	59 49	23 20
Packerort Light	59 24	24 05
Surp Point and Light	59 28	24 28
Revel	59 25	24 50
Kasch Skar Light	59 38	25 09
Hoogland Isl. N. End	59 58	27 07
Seeskar Isl. N. End	59 56	28 30
Tol Beacon Light	60 01	29 40
Cronstad	59 57	29 54
PETERSBURGH	59 59	30 20

The Coast of Norway and Lapland, from Christiana to Archangel.

Names of Places.	Lat.	Long.
	D. M.	D. M
Christiana	59 53N.	10 52E.
Frederickstad	59 10	11 02
Faerder Light	59 03	10 39
Christiansand	58 19	08 14
NAZE	58 07	07 15
Walbert's Head	58 32	05 56
Bommel Head	59 31	05 00
Ulster's Islands	59 24	04 50
Bergen	60 14	05 11
Ronde Light	62 22	05 40
Drontheim	63 26	10 20
Werro Island	67 40	11 26
North Cape	71 10	26 01
North Kyne Cape	71 06	27 44
Wärdhur's Island	70 30	30 40
Fisher's Island	70 03	31 41
Terrybem Point	69 10	33 58
Nagle Island, N. Point	68 33	35 40
Cape Sweetnose	67 59	37 30
Lambachoe Point	67 34	38 30
Cape Orlogenose	67 02	39 21
Cross Island, N. Point	66 21	38 45
Onega	63 36	37 20
Cape Donega	64 45	35 42
ARCHANGEL	64 34	38 59
Blue Point	65 19	38 05
Cape Bona Fortuna	66 24	40 24
Morsham Island. M.	66 39	40 40
Cape Candinose	68 22	41 25
Nova Zembla	78 06	72 20

Coast of France, Spain, and Portugal, from Calais to Gibraltar.

Calais	50 57N.	01 51E.
Cape Grisness	50 52	01 35
Boulogne	50 43	01 37
Etaples	50 31	01 38
St. Val. sur Somme	50 11	01 38
Dieppe	49 55	01 04
St. Valery in Caux	49 52	00 04
Fecamp	49 45	00 23
Cape de Caux	49 42	00 11
Cape de la Heve Ligh	49 31	00 04
Havre	49 29	00 06
Honfleur	49 25	00 14
PARIS	48 50	02 20
Point de Conebar	49 22	00 31W
Point de la Percee	49 23	00 56
St. Marcou Island	49 30	01 07
Cape Barfleur Light	49 42	01 16
Cherbourg	49 38	01 37
Cape La Hogue	49 44	01 55
Alderney Isl. N. End	49 45	02 11
Casket Lights	49 45	02 26
Guernsey I. S. Pierre	49 29	02 33
Sark I. Windmill	49 24	02 25
Jersey I. C. Grisness	49 15	02 14
—S. Aubin	49 11	02 10

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat. D. M.	Long. D. M.
Corbier	49 11N.	02 15W
Chosey Island, Middle	48 52	01 49
Coutances	49 03	01 27
St. Margaret	48 56	01 32
Granville Light	48 50	01 36
Avaranches	48 41	01 22
Mount St. Michael	48 38	01 31
St. Malo	48 39	02 01
Tower de la Conche	48 41	02 03
Cape Frebel Light	48 41	02 19
St. Brieux	48 31	02 43
Brehat Isl. North End	48 51	02 56
Rock Douver, Mid.	49 05	02 53
Seven Island, Middle	48 55	03 24
Triangle Rocks, E. End	48 54	03 36
Rock Blanch	49 01	03 57
Isle of Bas, N. End	48 46	04 00
Le Four Isle	48 36	04 45
USHANT LIGHT	48 28	05 03
Point Matthews	48 20	04 46
Brest	48 23	04 29
Point Raz	48 04	04 45
Saint's Rocks	48 05	05 03
Point l'Abbe	47 49	04 23
Glenan Islands	47 42	04 00
Quimperlay	47 52	03 33
L'Orient	47 44	03 22
Quiberon, S. Point	47 28	03 04
Isle de Groas, E. Point	47 38	03 26
Belle Isle	47 17	03 05
Houat Island, Middle	47 23	02 58
Hedic Island	47 21	02 51
Isle d'Yeu N.W. End	46 42	02 20
Auray	47 40	02 58
Vannes	47 39	02 45
Croisic	47 17	02 30
Nantes	47 13	01 33
Noirmoustier I. N. End	47 02	02 14
St. Gillies	46 41	01 56
Roche Bon	46 16	02 24
Isle of Rhee, Light	46 15	01 33
Lt. Tower of Oleron	46 03	01 24
Cordovan Light	45 35	01 10
Royan	45 37	01 02
Bourdeaux	44 50	00 34
C. Feret	44 40	01 16
C. Breton	43 39	01 25
Bayonne	43 29	01 29
St. Jean de Luz	43 23	01 40
C. Machicaco	43 29	02 40
Bilboa	43 15	02 43
C. Mayor	43 30	03 38
St. Vincent	43 23	04 15
Villa Viciosa	43 34	05 20
Gijon	43 35	05 38
C. Penas	43 43	05 48
Aviles	43 35	05 53
Rebadeo	43 33	07 02
C. Ortegal	43 47	07 49
Ferrol	43 28	08 16
C. Finisterre	42 54	09 16
C. Corobedo	42 39	09 10
Vigo	42 14	08 34
C. Viana	41 47	08 43

Names of Places.	Lat. D. M	Long. D. M.
Oporto Bar	41 11N.	08 40W
C. Mondego	40 11	08 52
I. Farilhoens	39 29	09 34
Burlings mid. great	39 25	09 31
Lisbon Rock (Cape)	38 45	09 26
Lisbon	38 42	09 07
C. Espichel	38 25	09 10
St. Ubes	38 31	08 42
Sines	37 55	08 46
C. St. Vincent	37 02	09 01
Lagos	37 08	08 39
C. St. Mary	36 56	07 51
Pt. des Humbria	37 06	07 03
Pt. Avenilla	37 05	06 57
St. Lucar	36 45	06 16
Seville	36 59	05 58
Cadiz	36 32	06 17
C. Trafalgar	36 10	06 01
Island Tarifa	36 01	05 35
Gibraltar, Europa Pt.	36 06	05 21

North Coast of the Mediterranean.

Names of Places.	Lat. D. M	Long. D. M.
Malaga	36 43N.	04 25W
Modrill	36 45	03 32
Tower of Sentina	36 41	02 48
Almeria	36 51	02 32
C. de Gatt	36 44	02 14
Pt. Media Naranja	36 55	01 58
Cabeso de Cape	37 25	01 33
Carthagena	37 36	01 01
Cape Palos	37 37	00 42
Alicant	38 21	00 30
C. St. Martin	38 47	00 09E.
Denia	38 52	00 05
Valencia	39 26	00 18W
C. Oropesa	40 06	00 07E.
River Ebro, Entrance	40 43	00 55
C. Salo	41 04	01 11
Terragona	41 09	01 18
Barcelona	41 23	02 11
C. St. Sebastian	41 54	03 08
Bay of Roses	42 14	03 11
Cape Creux	42 20	03 16
Collioure	42 32	03 05
Perpignan	42 42	02 54
Narbonne	43 11	03 00
Agde	43 19	03 28
Fort Brecon	43 16	03 30
Cette Lights	43 24	03 42
Montpelier	43 26	03 52
Aigues Light	43 32	04 11
Tour de Bouc	43 22	04 59
Marseilles	43 18	05 22
La Ciotat	43 10	05 37
Toulon	43 07	05 56
Hieres	43 08	06 08
Gien	43 02	06 07
C. Tailla	43 08	06 44
Frejus	43 26	06 44
St. Tropez	43 16	06 38
C. Gross	43 32	07 09
Cannes	43 34	07 00

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat. D. M.	Long. D. M.
Antibes	43 35N.	07 07E.
St. Marguerite, Island	43 31	07 04
Nice	43 42	07 16
Villa Franche Light	43 40	07 19
Cape Melle	43 58	08 21
Savona	44 17	08 26
Genoa	44 25	08 59
Rapallo	44 20	09 17
Point Venere	44 02	09 46
Pisa	43 43	10 23
Florence	43 47	11 15
Leghorn	43 33	10 16
C. Mount Nero	43 24	10 23
Vada	43 19	10 37
Cape Troy	42 49	10 44
Point Hercole	42 23	11 12
Civita Vecchia	42 06	11 46
Rome	41 54	12 28
Cape d'Auzia	41 24	12 37
Cercello Point	41 12	13 05
Gaeta	41 12	13 31
Naples	40 50	14 17
Salerno	40 42	14 46
Policastro	40 04	15 46
Cape Vatican	38 36	16 08
Cape Scylla	38 14	16 03
Cape del Arme	37 56	15 59
Cape Spartevento	37 53	16 25
Cape Colonne	39 03	17 38
Cape Lizza	39 18	17 32
Taranto	40 16	17 38
Cape St. Mary	39 40	18 53
Cape Otranto	40 05	19 05
Brindisi	40 40	18 03
Manfredonia	41 39	16 17
Ortona	42 36	14 52
Ancona	43 38	13 29
Comachio	44 25	12 03
Chiozza	45 15	12 04
Venice	45 40	12 21
Trieste	45 49	13 53
Rovigno	45 12	13 49
Segnia	45 11	15 19
Zara	44 26	16 01
Sebenico	44 03	16 34
Narenta	42 52	18 03
Cape Palli, N. Point	41 21	19 44
Cape Lenguetta	40 30	19 48
Butrinto	39 50	20 19
Cape St. Nicholas	39 34	20 30
Larta	39 08	21 22
Athens	37 58	23 50
Coron	36 47	21 59
Cape Matapan	36 23	22 29
Cape St. Angelo	36 26	23 13
Napoli	36 43	23 01
Corinth	37 53	23 02
Cape Doro Rock	38 10	24 37
Salonica	40 39	22 45
Lagos	40 53	25 03
Cape Macri	40 35	25 37
Dardanelles	40 10	26 18
Galipoli	40 26	26 38
CONSTANTINOPLE	41 01	28 55

East and South Coast of the Mediterranean.

Names of Places.	Lat. D. M.	Long. D. M.
Scutari	41 00N.	28 58E.
Cape Janissari	40 02	26 04
Cape Baba	39 45	25 56
Adramietta	39 34	26 58
Smyrna	38 28	27 07
Cape Volpe	36 38	27 43
Macri	36 32	28 31
Seven Capes	36 18	28 37
Cape Chelidoni	36 20	30 21
Rosa Island	36 12	29 23
Satalia	37 02	30 31
C. Draumonte	36 27	32 00
Cavelero Point	36 30	33 05
Cape Urio		
Yasso	36 44	36 04
Alexandretta or Scanderoon	36 35	36 15
Cape Porco	36 14	35 48
Aleppo	36 11	37 10
Tripoly, (in Syria)	34 46	36 07
C. Vardo	34 30	35 48
Cape Serpente	33 36	35 37
Cape Blanco	33 17	35 32
St. John D'Acre	33 14	35 38
Jaffa	32 04	35 05
Cape Gallo	31 24	33 18
Damietta	31 31	32 00
Cape Bourlos	31 43	31 16
Rosetta	31 23	30 43
Aboukir	31 19	30 25
Nelson's Island	31 21	30 23
Alexandria	31 11	30 11
Cape Rose	30 59	29 25
Cape Solomon	31 43	25 11
C. Razatin	32 28	23 15
Derne	32 51	21 52
Cape Rasat	33 01	20 27
Cape Mensurato	32 07	15 11
Tripoli	32 54	13 18
Cape Gregis	33 59	11 35
Cape Paul	35 11	11 09
Suza	35 39	10 45
Cape Bon	37 05	11 05
Tunis	36 46	10 16
Cape Blanco	37 27	10 07
Cape Roso	37 20	09 02
Cape Ferro	37 18	07 45
Cape Bugaroni	37 06	07 13
Cape Carbon	36 42	05 09
Cape Tedels	36 57	04 13
Cape Matifus	36 54	03 40
Algiers	36 49	03 00
Pic Monogere	36 33	02 29
Cape Albicel	36 39	02 17
Cape Tennis	36 32	01 18
Cape Tulsema	35 58	00 06
Point Abuja	35 54	00 25
Oran	35 44	00 41
Cape Ferrat	35 55	00 43
Cape Falcon	35 46	00 46

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Latitude	Long.
	D. M.	D. M.
Cape Figalle . .	35 32N.	01 03W
Cape Sigabe . .	35 44	01 06
Cape Hone . .	35 11	02 04
Cape Tres Forcas .	35 28	02 57
Alhucemas . .	35 16	03 48
Penon de Velez .	35 12	04 15
Cape Negril . .	35 41	05 15
Tetuan . . .	35 29	05 21
Ceuta Point . .	35 54	05 17
Tangier . . .	35 48	05 49
Cape Spartel . .	35 49	05 54
Islands in the Mediterranean.		
Alboran . . .	35 57N.	03 02W
Formenterra C. Mola	38 37	01 38
Ivica N.E. Point .	39 03	01 37
Ivica S. Point . .	38 49	01 25E.
Columbretes . .	39 56	00 43
Cabrera . . .	39 07	03 00
Majorca.		
C. Formenton . .	39 57	03 18
S. Point, C. Salini .	39 16	03 08
E. Point, C. Pera .	39 43	03 33
Dragonera Isle .	39 33	02 27
Palma . . .	39 32	02 40
Minorca.		
C. Bajoli . . .	40 01	03 52
Port Mahon . .	39 52	04 25
Corsica.		
Cape Corse . .	43 01	09 22
Saint Fiorenzo .	42 35	09 19
Calvi . . .	42 34	08 43
Ajaccio . . .	41 50	08 42
South Point . .	41 22	09 12
Tower Diana . .	42 08	09 34
Bastia . . .	42 42	09 27
Sardinia.		
Cape Longo Sardo .	41 14	09 08
Asinari, N.E. Point .	41 08	08 23
Cape Caccia . .	40 34	08 05
Cape St. Marco .	39 53	08 26
I. S. Pedro, W. Point	39 08	08 07
Cape Teulada . .	38 51	08 36
Isle Toro (Rock) .	38 50	08 17
Caglaria . . .	39 14	09 07
Cape Carbonera .	39 07	09 28
Cape Ferrato . .	39 23	09 42
Cape Bellavista .	40 02	09 52
Cape Comino . .	40 34	09 53
I. Biche . . .	41 05	09 35
Gorgona . . .	43 25	09 54
Capraria . . .	43 00	09 49
Elba, West End .	42 44	10 03
Pianoza . . .	42 34	10 04
Formigues . .	42 23	10 07
Monto Christo .	42 20	10 18
Gilio . . .	42 21	10 54
Ganulo . . .	42 14	11 05
Palmaria . . .	40 56	12 51
Ponza, South End .	40 54	13 00
Ischia, South Point .	40 40	13 55
Capri, S. W. Point .	40 32	14 14

Names of Places.	Lat.	Long.
	D. M.	D. M.
Sicily. Messina.		
Cape Orlando . .	38 08N.	14 53E.
Cape Cefala . .	38 01	14 07
Cape Cafrano . .	38 09	14 34
Palermo . . .	38 07	13 22
Cape Gallo . .	38 12	13 17
Cape St. Vito . .	38 12	12 45
Trapano . . .	38 02	12 29
Cape 3. Fontani .	37 35	12 36
Cape Alicante . .	37 03	13 53
Cape Saramis . .	36 47	14 36
Cape Passaro . .	36 40	15 17
Syracuse . . .	37 07	15 22
Cape Moline . .	37 36	15 19
Stromboli . .	38 48	15 23
Lipari, South Point .	38 31	15 11
Salina, East Point .	39 19	15 09
Felicuri . . .	38 40	14 42
Alicudi . . .	38 41	14 23
Ustica, West Point	38 47	13 17
El Navio . . .	38 47	14 48
Levanso . . .	38 03	12 18
Maritimo . .	38 02	12 01
Favouillane . .	38 00	12 18
Galiti, East Point .	37 48	09 18
Esquerques . .	37 47	10 55
Keith's Reef . .	37 49	11 10
Pantellaria, N. Point	36 55	12 11
Linosa, N. Point .	35 56	13 03
Lampidosa, N. Point	35 40	12 49
Goza, N.W. Point .	36 05	14 07
Malta, C. Comoneto	36 01	14 18
La Valetta . .	35 53	14 30
P. Marza, Sirocco .	35 05	14 34
Gulf of Venice.		
Fano . . .	40 02	20 40
Pelegosa . . .	42 23	16 32
Plana . . .	42 13	16 00
Tremite . . .	42 13	15 43
Lissa, South Point .	42 55	16 30
Pomo . . .	43 10	15 43
Longa, S.E. Point .	44 11	15 34
Coronate, N.W. Point	44 10	15 37
Sansego, S. Point .	44 36	14 30
Brazza, N.W. Point	43 20	16 56
Palermo, Is. Lusina	43 12	16 51
Curzola, W. Point .	42 47	17 00
Agosta N. Point .	42 35	17 04
Melida, W. Point .	42 31	17 40
Cephalonia S. Point	37 55	21 17
—Cape Viscardo .	38 24	21 03
Corfu, Point Timon	39 38	19 58
Paxu, N.W. Point .	39 08	20 23
Zante, S. Point .	37 30	21 11
Strofadia . . .	37 20	21 14
Cabrera, S. Point .	36 40	21 39
Archipelago.		
Cerigo, South Point	36 08	22 57
Cerigotto . .	35 49	23 17
Milo Town . .	36 42	24 22
Scio, Town . .	38 17	26 06
Mytelene Town .	39 10	26 26
Tenedos . . .	39 43	25 52
Lemnos, N.E. Point	40 00	25 26

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Candia.		
Cape Crio	35 10N	23 25E.
Cape Spada	35 41	23 40
Suda	35 23	24 05
Cape Susa	35 28	25 07
Candia	35 19	25 18
Cape Sidera	35 10	26 17
Cape Salamone	35 01	26 26
Goze, South Point	34 50	23 50
Panto, N. E. Point	35 49	26 58
Rhodes, Town	36 27	28 30
—Cape Tranquillo	35 51	27 30
Cyprus.		
Cape Andrew	35 41	34 28
Cerina	35 14	32 48
Cape Salizano	35 08	31 41
Cape de Gatt	34 34	33 05
Cape Grego	35 07	34 02

Coast of AFRICA, from Cape Spartel to the Cape of Good Hope.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Cape Spartel	35 49N.	05 54W
Larash	35 12	06 06
Mazagan	33 18	08 25
Cape Blancho	33 10	08 38
Cape Cantin	32 34	09 05
Mogadore Island	31 27	09 36
Cape Geer	30 38	09 52
Santa Cruz	30 27	09 40
Cape Nun	28 40	11 15
Cape Blanca	27 57	12 54
Cape Bajador	26 12	14 27
Horn Is. ent. of Rio do Ouro	23 35	15 18
Cape das Barbas	22 15	16 40
Isle de Lobo	21 07	17 15
Cape Blanco	20 55	17 10
Cape St. Ann	20 42	16 35
Cape Myrick	19 12	16 21
Portendick	18 06	16 04
Barbary Pt. ent. of Senegal Bay	15 53	16 31
Cape Verd	14 44	17 31
Breakers off do.	14 50	17 58
Goree Island	14 40	17 25
Cape Naze	14 24	17 18
Cape St. Mary, ent. to River Gambia	13 17	16 56
Cape Roxo	12 23	17 10
Cape Vergu	09 52	14 56
Delos Isles	09 29	14 07
Leopards Isle	08 40	13 08
Cape Sierra Leone	08 29	13 09
Cape Anne	07 07	12 22
Cape Mount	06 46	11 48
Cape Monserrado	06 16	11 17
Cape Baxos	05 28	10 07
Sestos River	05 27	09 47
Cape Formosa	05 08	09 39
Cape Palma	04 30	07 41
St. Andrew's River	04 58	06 10
Cape Maho	05 12	05 12
Cape Apollonia	04 59N.	03 10W
Axim	04 52	02 36
Cape Three Points	04 40	02 44
Dix Cove	04 44	02 38
Sakondee	05 00	01 59
Elmina Castle	05 02	02 00
Cape Corse Castle	05 12	01 48
Annamaboe Fort	05 10	01 39
Kormantens Fort	05 11	01 34E.
Devil's Hill	05 24	00 50W
Acra	05 30	00 16
River Volta	05 53	01 25
Cape St. Paul	05 52	01 40
Whidah	06 25	03 13
Formosa River	05 53	06 10
Cape Formosa	04 30	06 40
New Callabar River	04 23	08 00
Cameron River	03 20	10 00
Cape St. John	01 15	09 23
Gabon River	00 00	09 23
C. de Lopez Gonsalvez	00 47S.	09 12
Sesto River	02 16	09 35
Alvary Bay	03 27	10 40
Congo Rirer	04 35	11 05
Ambris River	06 45	12 00
Cape Ledo	09 50	12 03
St. Philip de Benguela	12 18	12 35
Cape Negro	16 00	11 44
Tigers Island	16 30	12 00
Cape Frio	18 40	13 42
C. Rostro de Pedro	23 00	14 00
Cape das Voltas	29 00	16 45
St. Helen's Bay		
Cape St. Martin's	32 45	17 45
Saldanneh Bay	33 08	18 00
Cape of Good Hope	34 29	18 23

Islands, Rocks, and Shoals, in the North Atlantic Ocean, and South Atlantic, or Southern Ocean.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Rockal	57 13N	14 18W
Atkins Shoal	55 06	11 32
Chapel Rock	47 34	07 12
—Devil's Rock	46 25	13 12
—Rock	36 30	23 10
Steen Ground	32 45	21 25
Josyna Rock	30 46	24 41
Azorcs or Western Islands.		
Corve, South Point	39 41	31 07
Flores, Pt. Delgada	39 33	31 07
Fayal, S. E. Point	38 30	28 42
Pico, Summit	38 27	28 28
—Point de Espertal	38 26	28 36
—East Point	38 22	28 06
St. George, S.E. Pt.	38 31	27 50
Graciosa		
—Villa da Praya	39 02	27 59
Terceira, Angra	38 38	27 14
St. Michael		
—Pta. Delgada	37 44	25 44
—Pta. Ferraria	37 54	25 58
—North East Point	37 52	25 14

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat.	Long.
	D. M.	D. M
Formigas, or Ants .	37 17N.	24 54W
St. Mary, Town .	36 58	25 12
—West Point . .	36 59	25 16
—Punta da Castello	36 57	25 06
Madeira Isles.		
Porto Santo Town .	32 58	16 25
Madeira		
—Lorenzo Point .	32 43	16 47
—Tristam Point .	32 54	17 25
—Funchal . .	32 37	17 05
S. Desertos, South Pt.	32 22	16 36
Salvages, Middle .	30 08	15 53
Piton . . .	30 01	16 06
Canary Isles.		
Palma, Town S. Cruz	28 37	17 46
—North Point .	28 54	17 55
—South Point . .	28 30	17 53
Ferro Valverde .	27 48	17 59
Gomero, Port . .	28 06	17 09
Teneriffe		
—Hidalgo Point .	28 36	16 21
—Oratava . .	28 25	16 35
—Tena Point . .	28 20	16 57
—Peak . . .	28 17	16 39
—Port Christianos .	28 03	16 45
—Santa Cruz . .	28 28	16 16
Canary, N. E. Point	28 13	15 25
—Palmas . .	28 07	15 26
—South West Point	27 55	15 52
Fuerteventura		
—Point Gorda .	28 46	13 52
—South West Point	28 04	14 32
Lanzarote, S. Point	28 51	13 47
—Puerto de Naos .	28 58	13 33
—Punta del Farion .	29 15	13 29
Graciosa . . .	29 17	13 31
St. Claire . .	29 18	13 32
Alegranxa . .	29 25	13 30
Cape Verd Islands.		
St. Antonio		
—Santo Cruz . .	17 13	25 15
—South End . .	16 58	25 28
St. Vincent . .	17 01	25 06
St. Lucia, S. Point .	16 46	24 55
St. Nicholas, N. Point	16 50	24 37
—East Point . .	16 30	24 12
Salt I. South Point .	16 38	22 56
Bonavista, N. Point	16 04	22 45
Mayo, South Point .	15 06	23 10
St. Jago, Port Praya	14 54	23 31
Fogo, North Point .	14 57	24 22
Brava, South Point .	14 51	24 43
Porgas Bank, N. end	17 50	19 10
—South end . .	14 45	19 45
*Penedo de St. Pedro, or St. Paul's	00 55	29 30
Fernandez Po . .	03 28	08 40E.
Prince's Island .	01 37	07 40
St. Thomas' Isle .	00 19	06 42
St. Matthew's . .	01 35S.	07 30W

Names of Places.	Lat.	Long.
	D. M.	D, M.
Annabona, N. end .	01 25S.	05 45 .
Ascension . .	07 57	14 15W
St. Helena, Jamestown	15 55	05 43
Fernand de Noronha	03 56	32 24
Rocks . . .	03 56	34 30
Abrolhos Shoals .	18 06	39 36
Ascensao . .	20 25	35 40
Trinidad Is. S. E. Pt.	20 30	29 00
Martin Vas . .	20 29	28 30
Saxemburg . .	31 45	17 40
Tristan de Cunha .	37 00	12 00
Inaccessible I. .	37 19	11 50
Nightingale I. . .	39 29	11 48
Diego Alvarez .	39 13	10 40
Pepy's Island . .	45 30	35 30
Isle Grande . .	44 40	40 36
Falkland Islands.		
—Port Egmont .	51 10	60 16
—Cape Percival .	51 27	61 18
Christmas Bay, Is. Desolation	48 41	68 53
Aurora Island	52 06	48 17
	52 33	48 06
Bunkers Rocks .	53 54	40 31
South Georgia.		
—Cape Buller .	53 58	37 40
—Wallis Isle . .	54 00	38 29
Sandwich Bay .	54 42	36 12
Cooper's Island .	54 57	36 04
Cape Disappointment	54 58	36 15
Green Isles . .	54 59	36 15
Pickersgill Island .	54 42	36 58
Clerk's Rocks .	55 05	34 42
Sandwich Land.		
Candlemas Islands .	57 10	27 13
Saunders' Isle . .	58 00	26 58
Cape Montague . .	58 33	26 46
Friesland Peak .	59 02	26 55
Southern Thule .	59 34	27 45

The Coast and adjacent Islands from the Cape of Good Hope to Canton.

Eastern Coast of Africa.		
Cape of Good Hope	34 29S.	18 23E.
False Cape . .	34 16	18 44
Cape Agulhas . .	34 44	20 15
Cape St. Brass .	34 28	21 59
Cape Talhado . .	33 27	24 07
Cape Delgado .	33 38	24 10
Algoa Bay . .	33 30	26 35
First Pt. of Natal .	32 11	28 51
Middle Pt. of Natal	30 45	30 20
Port Natal . .	29 50	30 57
Smoky Cape . .	27 07	32 15
Delagoa Bay		
—Cape St. Mary .	25 51	33 16
Cape Corientes .	23 37	36 35
Cape St. Sebastian .	21 35	36 25
Sofala . . .	20 15	35 32

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* This small island, called St. Peter or St. Paul's, lies in the Atlantic, near the Equator, and is very dangerous, as it cannot be seen from a ship's deck more than nine miles in the day time, and not more than one mile at night.

TABLE XIX. OF LATITUDES AND LONGITUDES.

Names of Places.	Lat. D. M.	Long. D. M.
Angoxa	16 11S.	39 27E.
Mozambique	14 56	40 29
Cape Delgado	10 06	41 15
Mombas	03 34	41 30
Melinda	02 45	41 47
Magadosha	02 20N.	46 25
Cape Bassas	04 50	49 02
Cape Orfui	10 29	51 38
Cape Guardafui	11 47	51 35
The Red Sea.		
Cape Babelmandel	12 35	43 28
Socotoro, I. E. Point	12 15	54 55
Suez	30 02	32 28
Mocha	13 16	44 00
Coast of Arabia.		
Cape Aden	12 45	45 17
Cape Morebat	17 16	54 19
Cape Pedro	17 54	55 27
Cape Isolette	19 04	57 18
Great Mazeira I.	20 15	58 31
Cape Rosalgate	22 36	59 54
Muscat	23 30	58 16
Gulf of Persia.		
Cape Musseldom	26 17	56 17
Cape Jask	25 57	57 15
Gambaroon	27 18	56 06
Bassora	30 31	47 32
Malabar Coast.		
Cape Monze	25 00	66 18
Point Gigat	23 30	68 35
Diu Point	20 44	69 50
Cambay	23 36	72 17
Surat	21 10	72 26
Damaun	20 22	73 03
St. John's Cape	20 06	72 34
Basseen Fort	19 19	72 55
BOMBAY	18 56	72 54
—Lighthouse	18 53	72 53
Coullaba Island	18 37	72 56
Bancoot	17 57	73 08
Gheriah	16 37	73 22
Vingorla Rocks	15 55	73 30
GOA	15 31	73 55
Aguada Point	15 29	73 48
Carwar Head	14 47	74 12
Barcelore	13 53	75 02
Permira Rocks	13 13	74 04
Mangalore	13 00	75 35
Mount Dilly	12 05	75 35
Cananore	11 51	75 25
Sacrifice Rock	11 28	75 31
Calicut	11 20	75 50
Cranganore	10 17	76 06
Cochin	09 58	76 16
Quilon	08 52	76 37
Anjango Roads	08 39	76 50
Coromandel Coast-		
CAPE COMORIN	08 04	77 34
Manapar Point	08 29	78 15
Trinchindore Pagoda	08 37	78 24
Point Calymere	10 13	79 54
Negapatam	10 32	79 53
Tranquebar	10 56	79 40
Porto Nova	11 30	79 45
Cuddalore	11 41N.	79 38E.
Pondicherry	11 42	79 59
Madras	13 05	80 35
Point Divy	16 02	81 29
Masulipatam	16 16	81 24
Point Gordewar	16 45	82 37
Coringa Bay	16 58	82 30
Visigapatam	17 46	83 15
Gamjam	19 25	85 07
Jagernaut Pagoda	19 48	85 57
Black Pagoda	19 51	86 10
False Point	20 17	86 51
Point Palmiras	20 44	87 10
Balasore	21 21	87 21
Ingerlee Pagoda	21 50	88 11
Kedgeree	21 48	88 50
CALCUTTA		
—Fort William	22 35	88 28
Chandernagor	22 51	88 30
Pegu		
Islamabad, or Chittagong	22 20	91 52
Aracan River	20 17	93 00
Cheduba Island	18 45	93 37
Cape Negrais	16 08	94 09
Malay.		
Tavay Point	13 37	97 44
Mergui	12 10	98 19
Junk Seylon	08 15	98 02
Pulo Penang, or P. of Wales' Island		
—Fort Cornwallis	05 27	100 25
Malacca	02 12	102 11
Cape Romania	01 15	104 05
Siam	14 18	100 55
China.		
Camboja Point	08 45	103 45
Cape Avarello	12 54	107 50
Pulo Canton	15 15	107 15
Turon Bay	16 04	106 30
Ty-Chook Chow	21 26	111 23
Chun-Chow Island	21 29	111 29
Song-Chew Point	21 31	111 39
Huilang San Harbour	21 34	111 49
Ty-ho Bay	21 43	112 15
Ty-wock Island	21 39	112 07
Two Rocks nearly south of do.	21 31	112 06
Mong-chow Island	21 39	112 27
Mandarin's Cap	21 28	112 22
Namo Harb. in false St. John's S W. end	21 35	112 34
Wizard Rocks	21 48	113 02
Mow-Chow Harbour	21 58	110 26
Macao	22 13	113 32
Lintin Peak	22 24	113 50
Lankeet Hill	22 41	
Grand Ladrone	22 02	113 46
CANTON.	23 07	113 16

TABLE XIX. OF LATITUDES AND LONGITUDES.

Islands, Rocks, and Shoals in the Indian Ocean.

Names of Places.	Lat.	Long.
	D. M	D. M
Marseveen	41 30S.	20 46E.
*Telemarque Shoal	38 05	22 18
Fortune Shoal	33 08	43 05
Augusta Shoal	33 44	36 16
Dutch Bank	37 20	38 52
P. Edward Isles		
—North End	46 39	38 02
—South End	46 52	37 47
Kergulen's Land		
Bligh's Cape	48 29	68 38
—Christmas Harb.	48 41	69 02
—Cape Digby	49 23	70 32
—Cape George	49 54	70 12
—Port Palliser	49 03	69 35
Amsterdam Island	37 51	77 44
St Paul	38 44	77 18
Cloate's Island	21 45	93 27
Trial Rocks	20 40	104 30
Christmas Island	10 35	104 49
Keeling's Islands	12 03	97 38
Madagascar Island.		
Cape St. Mary	25 33	44 55
St. Augustin's Bay	23 35	43 09
Cape St. Vincent	21 46	43 37
Cape St. Andrews	16 06	45 32
Cape St. Sebastian	12 30	49 44
Cape Ambro, or Natal	12 02	50 19
Antongil Bay, Entr.	15 27	50 23
St. Mary's Island	16 54	50 36
Juan de Nova	17 15	43 07
Foul Point	17 41	49 53
Port Dauphin	25 00	47 05
Mozambique Passage.		
Bassas de India	22 20	41 30
Europa Rocks	21 30	40 17
Sussex Rocks	21 29	42 26
Bazaruto Rocks	21 16	36 30
English Bank	17 30	39 27
St. Christopher's Isl.	17 10	43 50
Coffin Island	17 28	44 07
Chesterfield Shoal	16 17	44 00
Comoro Isles.		
Mayotta	12 47	45 30
Johanna Island	12 15	44 35
Mohilla	12 30	43 55
Comoro	11 32	43 30
John Martin's Island	10 09	43 15
Portuguese Shoals	12 33	46 55
Aldabra Islands	09 40	46 45
Assumption	09 46	47 37
Cosmoledo Islands	09 46	48 38
Sandy Islands	09 16	48 12
Natal Island	08 30	47 15
St. Peter's Island	09 34	50 47
Apalunia Island	09 35	86 42
John de Nova	10 15	53 30

Names of Places.	Lat.	Long.
	D. M.	D. M.
Astoes	10 22S.	53 20E.
Providence Island	09 15	53 32
Zanzibar I. S. End	06 10	40 45
Amirantel I. N.W. P.	05 10	53 45
—S. E. Part	06 30	55 00
St. Frances' Isles	07 10	56 30
Mahe Bank, N.W. part	03 50	54 05
—S. E. Part	05 20	56 30
Curreuse Island	04 19	55 47
Eagle Island	05 10	55 37
Seychelle Island	04 38	55 35
Sandy Island	15 10	55 05
NazarethBank, N.E part	13 35	61 44
—S. W. Part	16 45	60 00
St. Brandon	16 34	62 50
Roderigos	19 41	63 11
Port Louis	20 10	57 28
L'Isle Mauritius	20 10	57 35
Bourbon, St. Dennis	20 52	55 30
South Roquepiz	10 30	64 32
Speaker's Bank	04 45	72 57
Peros Banhos	05 30	72 20
Boddam's Island	05 22	72 15
Diego Garcia	07 20	72 35
Candu Islands	06 00	76 35
Adu Islands	05 30	76 20
Maldive I. S. E. Part	00 40	74 55
—N.W Part	07 15N.	73 40
Maldive Islands	08 15	73 29
Laccadive Isles		
—N. W. Part	12 36	72 25
—S. E. Part	10 00	72 45
Ceylon Island.		
—North Point	09 57	80 39
Point de Galle	06 01	80 19
—South Point	05 47	81 02
Grand Bassas	06 07	81 43
Elephant Point	06 20	81 39
Trincomaley	08 35	81 27
Bale of Cotton Rock	05 18	90 40
Preparis Island	14 50	93 35
Cocos Island		
—Great Cocos	14 05	93 14
—Little Cocos	13 58	93 07
Andaman Islands.		
Great Andaman, N. Pt.	13 30	92 30
—South Point	11 21	92 35
—Port Cornwallis	13 20	92 51
Little Andaman, S. Pt.	10 40	92 24
Barren Island	12 14	93 42
Narcondam Island	13 25	94 07
Nicobar Isles.		
—North Point	09 25	93 07
—South Point	06 51	94 17
Miroe Island	07 29	93 37
Nicobar, or Great Sambelong. S. End	07 10	93 40
Pulo Seyer	07 35	95 30

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* Telemarque Shoal extends about six or seven leagues in length, from N. E. by N. to S. E. by S. and is between one and two miles wide. On parts of it the sea breaks—the water, in its whole extent, discoloured and rippling.

TABLE XIX. OF LATITUDES AND LONGITUDES.

Islands, Rocks, and Shoals, between the Indian and Pacific Oceans, from Sumatra to New-Guinea.

Names of Places.	Lat. D. M.	Long. D. M.
Sumatra.		
Lucepara Point	03 11S.	106 19E.
Bencoolen	03 49	102 10
Achen Head	05 30	95 30
Straits of Malacca and Sincapore.		
Pulo Way, E. P.	05 42	95 33
Pulo Rondo, Ronde	00 06N	95 13
Pulo Brasse, E. Pt.	05 32	95 11
Cocos Isles	03 15	95 52
Hog Island, S. Point	02 30	95 45
Pulo Nias	00 57	97 02
Pulo Minton, S. Point	00 25S.	97 45
Good Fortune Isles		
—South Point	01 57	99 49
Nassau Isl. S. Point	03 15	100 25
Engano Island	05 20	101 54
Pulo Pera	05 46N.	99 08
Pulo Penang, or Pr. of Wales' Island	05 27	100 25
Pulo Jarra	03 57	100 17
Ent. of China Sea.		
Bintang, E. Entrance to the Straits of Sincapore	00 18S.	105 15
Pedra Branca	01 18N.	104 32
Pulo Aroe	02 28	103 30
Pulo Tinoy I.	02 30	105 52
Pulo Aor	02 40	104 43
Pulo Timon, S. Pt.	02 49	104 24
Anambas Isles.		
Pulo Domar	02 47	105 21
South Anambas	02 47	106 15
Saddle Island	02 17	105 44
Victory's, or Wood I.	01 34	105 47
Condor	08 40	105 45
Ent. of China Sea.		
Natuna Island	04 05	108 10
St. Julian's Island	00 45	106 38
Timbelan's Island	01 00	107 15
Sprit Island	00 07	106 30
Billiton, S. E. Point	03 06S.	108 15
Gaspar Island	02 25	107 08
—Shoal	01 09	106 46
Banca Island		
Point Pleasant, N.P.	01 33	106 00
Monopin Hill	02 01	105 06
East Point	03 04	106 17
Lucepara Island	03 11	106 06
The Seven Islands	01 05	105 24
Princes' Island	06 36	105 15
Oracaloe Island	06 06	105 32
Straits of Sunda.		
Crocatoa Island	06 06	105 22
Peak on Crocatoa Island	05 56	105 18
North Island	05 37	105 55
Pulo Babee, E. Ent.	05 45S.	106 20E.
Java Sea.		
The Brothers	05 01	106 04
Jason's Rock	05 30	106 21
Pulo Rachel	05 53	108 03
Carimon Java	05 48	109 25
Lubec Island	05 43	111 41
Great Salombo	05 28	113 18
I. Salombo,	05 33	113 13
Bratteron Shoals	05 30	113 41
Java Island.		
Java Head, W. Pt.	06 45	105 09
Anjer Point	06 03	106 02
Bantam Point	05 50	106 09
Batavia	06 11	106 50
Indermay Point	06 13	109 04
Cape Sandana	07 39	114 36
East Point	08 39	114 40
Wessels Bay	08 28	112 33
Turtle Bay	08 00	109 37
Winerow Point	07 25	106 05
Eastern Straits to China,		
Bally Island, S. Point	08 56	115 23
Bally Str. S. Ent.	08 45	114 47
Lombock Straits	09 10	115 57
Straits of Mass.	09 00	116 50
Little Paternosters		
—Southernmost	02 13	117 12
—Northernmost	02 15	117 12
Tonekaky	05 31	117 17
Straits of Sapy	08 30	119 32
Sandelwood Island	09 45	120 00
Rotto Island, S. End	11 15	123 07
Banda Sea.		
Timor I. W. Point	10 15	123 43
—South Point	10 23	123 58
Timor Laoot, S. Pt.	08 15	131 50
Timorland, S. Point	08 03	132 17
Amboyna	04 25	127 25
Gillolo, North End	02 17N.	127 20
—West End	01 03	127 01
Heri Island	00 59	126 54
Ternate Island	00 57	126 53
Celebes, N. Point	02 00	124 00
—South Point	05 42	120 06
Mariane Island	00 21S.	126 40
Sutta Mangle Island	01 48	126 17
Sutta Bassia	02 36	125 41
Burro Island, W. Pt.	03 03	125 43
Cambona Island	05 29	121 26
Donthin Hill	05 30	117 53
Macassar Town	05 11	117 28
Tonyn Island	05 27	118 02
Straits of Macassar.		
Bouton Island, S. P.	05 42	121 11
N.E. End of a Shoal off Bouton Island	05 25	122 08
Tocca Bassia Island	05 35	123 15
Saleyer Straits	05 44	120 06
Borneo Island.		
North Point	07 00N.	116 45
Unasang Point, E.P.	05 15	118 50
Point Salatan, S.E. P.	04 15S.	114 25
Point Sambar, S.W. P.	02 45	109 28

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Latitude	Long.
	D. M.	D. M.
Banguey . . .	07 17S.	117 30 E
Balambangan Island	07 30N.	117 02
Palawan, S. Point	08 28	117 30
—North Point .	11 20	119 46
Sooloo, East Point .	05 57	121 21
Sooloo Island, S. Point	05 57	121 15
—Temontanges .	05 57	120 53
Philippine Islands.		
Mindanao . .		
—Pt. St. Augustine	06 15	127 20
—Mindanao, S. Point	05 34	126 05
Goat Island . .	13 55	120 02
Luconia, N. Point .	18 45	120 45
—Manilla . .	14 36	120 51
Bastrees Islands.		
Grafton . . .	21 04	121 00
—Kumi . . .	24 33	122 47
Hoapainsu . .	25 50	122 40

Islands, Rocks, and Shoals, in the China Sea.

Pulo Brata . .	04 45N.	103 30E.
Ridang Island . .	06 20	102 37
Pulo Coron . .	07 17	102 30
Pulo Way . .	10 00	102 34
Pulo Uby . .	08 30	103 45
Two Brothers . .	08 32	105 37
Pulo Condor . .	08 40	106 32
Pulo Sapata . .	10 04	109 13
Shark's Bay . .	25 30	113 28
I. Rottenest. W. P. .	31 58	115 25
Geography Bay .	33 30	115 23
Cape Lewin . .	34 26	114 59
I. St. Alourn . .	34 27	115 03
Cape Chatham .	35 03	116 35
King George's Port	35 03	118 02
Point Hood . .	34 23	119 49
Bay of Saints . .	32 11	138 54
Kangaroo Bay .	35 43	138 07
King's Island . .		
Bay of Elephants .	39 53	144 33
Elephant Island .	10 04	108 42
Pitt's Island . .	10 55	114 35
Sandy Island . .	10 40	112 48
Smallkey . . .	10 37	112 44
Long Island . .	10 20	112 36
New Island . .	10 10	112 20
First Shoal . .	10 14	112 24
Second Shoal . .	10 04	112 15
Third Shoal . .	10 05	112 10
Reef . . .	10 15	112 00
Scarborough Rocks	15 05	117 36
Macclesfield Shoal		
—North Point .	16 06	114 10
—South Point . .	15 15	114 20
Triangles, N. Point	17 00	111 00
—South Point . .	16 00	111 32
Pratas Rock, N. Side	20 57	116 57
—S. W. Side . .	20 42	116 40
Paracel's. N. Part .	16 30	110 00
—South Part . .	11 37	109 30
Hainau, North Point	20 02	110 15
—South Point . .	18 12	109 20

The Coast and adjacent Islands from Canton to Cape North.

Names of Places.	Lat.	Long.
	D. M.	D. M.
Canton . . .	23 07N.	113 16E.
Macao . . .	22 13	113 52
Grand Ladrone .	22 02	113 56
Southernmost . .	08 00	114 06
Ningpo . . .	29 58	120 18
Pekin . . .	39 55	116 25
Cape Lopatka . .	51 00	156 42
Cape Gavareea .	51 20	158 36
St. Peter and St. Paul	52 52	158 46
Kronotskos Noss .	54 43	162 13
Kamschatka Noss .	56 01	163 18
Thadeus Noss . .	62 50	179 05
Cape Ischukotskoi .	64 14	173 31
East Cape . .	66 05	169 09
Sardz Kamen . .	67 03	171 54 W
Cape North . .	68 56	179 11
Grafton Island .	20 04	120 00E.
Formosa Isl. S. end .	22 05	120 50
—Tayoan . .	22 40	120 20
—North end . .	25 15	122 13
Great Lequeo, S. Pt.	25 15	128 30
—North Point .	28 00	128 30
Xuno Island, S. Point	31 30	131 50
--North Point . .	34 45	131 30
Japan.		
Nangasaki . .	32 44	129 52
Niphon Isl. S. end .	33 30	135 00
—North end . .	41 00	142 00
Matoosmaee . .	42 30	140 30
Mednos Island .	54 27	167 56
Beerings Island .	55 36	167 46
St. Lawrence Island	63 47	171 45

The Coast of New-Holland, and adjacent Islands.

Swilley Island .	43 55 .	147 07E.
South Cape . .	43 42	146 58
South West Cape .	43 37	146 05
Mew Stone . .	43 47	146 26
Tasman's Head .	43 33	147 33
Point Recherche .	43 32	147 06
Adventure Bay .	43 21	147 32
Cape Howe . .	37 31	145 31
Point Dromedary .	36 18	150 05
Cape St. George .	35 19	150 18
Red Point . .	34 29	151 15
Botany Bay . .	34 06	151 23
Port Jackson . .	33 50	151 25
Port Stephens . .	32 40	152 09
Cape Hawke . .	32 14	152 30
Smoaky Cape (near)	30 31	153 06
Cape Byron . .	27 27	153 30
Point Danger . .	28 08	153 33
Indian Head . .	25 03	
Cape Moreton .	26 56	153 32
Bustard Bay . .	24 04	151 44
Sandy Point . .	24 45	153 09

TABLE XIX. OF LATITUDES AND LONGITUDES.

Names of Places.	Lat.	Long.
	D. M.	M.
Cape Capricorn .	23 29S	151 02W
Cape Townshend .	22 15	150 17
Trinity Sound . .	22 10	149 42
Cape Palmerston . .	21 30	149 06
Cape Conway .	20 36	148 32
Cape Gloucester .	19 59	148 11
Cape Upstart . .	19 36	147 28
Cape Sandwich .	18 17	146 01
Cape Grafton .	16 57	145 54
Cape Tribulation .	16 06	145 21
Endeavour River .	15 26	145 14
Cape Bedford . .	15 16	145 15
Cape Flattery .	14 56	145 17
Cape Weymouth .	12 42	142 45
Cape Granville . .	11 58	142 22
York Cape . .	10 37	141 36
Cape Cornwall .	10 43	141 00
I. Possession . .	10 42	141 24
Endeavour Straits .	10 39	141 24
Islands and Rocks, &c. in the Pacific Ocean.		
Sledge Island . .	64 30N.	166 08E.
Clerk's Island . .	61 15	169 40W
Anderson's Island .	60 17	162 31
Gore's I. C. Upright	60 22	172 26
Key's I. S. W. End	59 48	143 08
Round Island . .	58 56	153 30
S. Hermogenes Isl .	58 15	152 13
Trinity Island . .	56 35	154 53
Foggy Island . .	56 12	157 19
Oonemak Island .	54 30	167 31
Cooper's Isl. S. Point	54 24	169 00
Oonalaska . .	53 55	166 26
Sulphur Island .	24 48	141 20
North Island . .	25 14	141 14
South Island . .	24 22	141 24
Tinian . . .	14 58	145 05
St. Andrew's Island	05 18	133 40
Dangerous Shoal .	02 53	136 10
Free-will or St. David's Islands	00 50	137 51
Pelew Islands .	07 19	134 40
Piscadores, N. End	11 20	165 44
—South End . .	11 00	166 45
Owyhee, N. Point .	20 17	155 59
—South Point .	18 54	155 48
—East Point . .	19 33	154 52
Mowee, East Point	20 50	155 55
—South Point .	20 34	156 12
—West Point . .	20 53	156 38
Kerajegoa . .	19 28	156 02
Tahowrooa . .	20 38	156 36
Moozokinnee . .	20 39	156 29
Rannai, South Point	20 46	156 55
Morotai, West Point	21 10	157 17
Woodhoo . .	21 42	158 01
Tahoora . . .	21 42	160 24
Oreehewa . .	22 03	160 06
I. Nekar . . .	23 34	164 32
Oimea Road . .	21 57	159 39
Oneehoow . .	21 49	160 13

Names of Places.	Lat.	Long.
	D. M.	D M
Whyteeie Bay .	17 30W	157 50W
Owhyee, Whymoa Road	21 57	159 42
Christmas. or Noel I.	01 58	157 35
Socona I. Middle .	18 48	110 10
Cape False . .	08 40S.	136 30E.
East Point . .	06 20	148 00
Louisiade Isles, E. P.	10 35	154 00
—West Point . .	01 30	148 30
Stephen's Island .	00 22	139 39
Durour's Island .	01 15	143 21
Matty's Island .	01 45	143 02
Admiralty Islands.		
Mid. of the largest .	02 18	146 44
Portland Isles, Mid.	02 27	148 03
Cape Byron . .	02 30	149 02
Duke of York Island	04 09	151 20
New Ireland, E. Pt.	05 00	152 30
—West Point . .	02 20	148 20
Cape St. George .	04 53	152 19
Queen Charlotte's Foreland	02 29	148 27
Sandwich Isl. Peak	02 53	149 17
N. Britain, East Pt.	04 53	153 09
—West Point . .	06 00	149 20
Port Praslin . .	04 49	153 06
Nine Islands . .	04 36	154 17
Bouganville Straits	07 05	158 56
Solomon Islands.		
Boca, North Point .	05 00	154 27
Eddystone . .	08 18	156 22
Cape Deception .	08 26	159 14
Kepple's Island .	10 15	165 04
Cape Surville . .	10 50	162 22
I. Volcan . .	10 25	165 48
Edgecomb's Island .	11 10	165 14
Ourry's Island .	11 10	165 19
Egmont Isle . .		
Cape Byron, N. E.	10 40	166 49
Lord Howe's Island	11 10	164 43
New Hebrides.		
I. or Pic de l'Etoile	14 29	168 09
Cape Cumberland .	14 39	166 47
Cape Queros . .	14 56	167 20
Leper's Island, N. E.	15 17	168 11
—South West .	15 30	167 45
Maskelyne's Islands	16 30	167 58
	16 34	168 01
	16 32	167 59
	16 33	167 59
Mallicolo. S. Cape .	16 38	167 42
—S. W. Cape .	16 31	167 36
Cape Sandwich .	16 28	167 59
Sandwich Harbour .	16 25	167 53
I. of Ambrim . .	16 09	168 13
Cape Lisburne .	15 41	166 57
St. Bartholomew I.	15 42	167 17
Aurora, North End .	14 52	168 13
—South End . .	15 24	168 21
Table Island . .	15 38	167 07
Witsuntide I. N. End	15 28	168 21
—South End . .	16 00	168 19
Ambrym Island. N. E. End	16 04	168 21

TABLE XIX. OF LATITUDES AND LONGITUDES.

Names of Places.	Lat.	Long.
	D. M	D. M.
—West End	16 15S.	168 03E.
Paoom	16 30	168 29
Apee, South End	16 53	168 37
—N. W. End	16 39	168 18
Sheppard's Island From	16 56	168 41
to	17 03	168 43
Three Hill Island	17 04	168 35
Reef off West End	17 08	168 28
One Hill Island	17 07	168 36
Two Hill Island	17 13	168 35
Monument	17 14	168 38
Hinchinbroke Island	17 25	168 38
Montague Island	17 26	168 31
Sandwich Island From	17 29	168 20
to	17 53	168 45
Traitor's Head	18 43	169 20
Small Island off	18 41	169 26
I. Erromanga	18 46	169 19
Inmer	19 16	169 46
Tanno Isl. From	19 16	169 21
to	19 38	169 43
Port Resolution	19 32	169 41
Inanama	19 31	170 21
Enatum	20 10	170 04
New Caledonia.		
Balleabea Island	20 07	164 22
Pudyoua Obs.	20 18	164 41
Cape Colnet	20 30	164 56
Cape Coronation	22 05	167 08
Queen Charlotte's Foreland	22 15	167 12
Isle of Pines	22 38	167 38
Botany Isl. anch. off	22 27	167 17
Norfolk Island	29 02	168 10
New Zealand.		
Three Kings	34 12	172 12
Cape Maria	34 30	172 42
North Cape	34 22	173 05
Mount Camel	34 51	173 10
Cape Brent	35 10	174 40
Cape Colville	36 26	175 33
Mercury Bay	36 47	175 56
Cape Runaway	37 32	178 12
East Cape	37 42	179 00
Mount Edgecumbe	37 59	166 53
Tolaga Bay	38 22	179 13
Poverty Bay	28 42	173 24
Albatross Point	38 04	175 18
Cape Table	39 07	178 24
Mount Edgecumb	39 16	174 45
Table Head	39 17	178 00
Shambles	39 20	178 21
Portland	39 25	178 12
Cape Kidnappers	39 43	177 36
Cade Turnagain	40 34	177 05
C. Stephens (Isl. off)	40 37	174 54
Ship's Stern	41 06	174 14
Banks' Island	43 32	173 30
Cape Saunders	45 44	167 48
Pickersgil Harbour	45 47	166 18
South Cape	47 19	167 48
I. of Snares	48 03	166 20
Knight's Island	48 15	166 44
Solander's Island	46 31	167 11
West Cape	45 54S.	166 43E.
Dusky Bay	45 47	166 18
Easy Harbour	45 40	166 18
Cape Farewell	40 33	174 00
Q. Charlotte's Ent.	41 00	175 15
—Sound	41 06	174 18
Cape Campbell	41 44	176 15
Cape Palliser	41 34	176 07
Point Rodney	36 15	175 07
Two Sisters	43 41	177 11
Skirmish Bay	43 49	176 35
Cape Young	43 48	176 58W
Friendly Isles.		
Duke of York's Isl.	08 29	172 22
Wallis' Island	13 18	178 30
Keppel's Island	15 53	176 18
Boscawen's Island	15 50	176 15
Navigation Isles.		
I. Opoun	14 10	169 06
—Leone	14 06	169 16
—Mahouna	14 21	170 17
—Pola	13 34	172 07
Port Refuge	18 18	173 56
Savage Island	19 02	169 30
Agyoau	19 39	174 43
Hapae, North Point	19 41	174 37
Mattafoa	19 44	174 47
Turtle Island	19 49	177 57
Annamooka	20 15	174 52
Tongotaboo, Rander main Road	21 04	174 56
Annamoke Ette	20 18	174 32
Commango Ette	20 18	174 23
Commango	20 19	174 26
Tonamai	20 23	174 31
Tellafageo	20 31	174 29
Morotoi	21 09	156 44
Eaoowe	21 20	174 34
Pylstaart's Island	22 23	174 48
Oheteroa	22 27	150 47
Toobovai	23 25	129 40
Palmerston Island	18 00	162 57
Whylotack	18 52	159 40
Harvey's Island	19 16	158 48
Owyhee	19 28	156 26
Wateoo Island	20 01	158 14
Mangea Island	21 57	185 03
Society Islands.		
Scilly Island	16 28	156 22
Ohamaneno	16 46	151 40
Howe's Island	16 46	154 07
Marua Island	16 26	152 33
Bolabola Island	16 32	151 52
Ulietea	16 32	152 57
Huaheine	16 43	150 52
Owharre Harbour	16 45	151 10
Lord Howe's Island	16 46	155 25
Duke of York's Isl.	17 28	151 14
Emio	17 30	149 54
Otaheite, Obs.	19 29	149 32
Point Venus	17 29	149 37
Oaitepeha Bay	17 46	149 14
Osnaburg	17 48	148 10
Palliser Island	15 38	146 30

TABLE XIX. Of Latitudes and Longitudes.

Names of Places.	Lat.	Long.	Names of Places.	Lat.	Long.
	D. M.	D. M		D. M.	D, M.
Chain Island	17 25S.	145 39W	Thrumb Cap	18 35S.	139 48E.
Oheterooe	22 37	150 49	Osnaburg Island	17 51	147 30
Toobouai	23 25	140 20	Blight Lagoon Is.	21 38	140 37
Taookaa Island	14 30	145 09	Pitcairn's Island	25 02	133 30
Adventure Island	17 06	144 18	Oparo	27 36	144 02
Furneaux Island	17 11	143 07			
Resolution Island	17 23	141 45	Hood's Island	09 26	138 52
Bird Island	17 48	143 35	Obevahoa	09 41	139 01
Groups, S. Eastmost	18 12	142 42	Ohitahoo Harbour	09 55	139 09
Bow Island, E. end	18 23	141 12	Onateaya	09 58	138 51
Prince Henry's I.	19 00	141 06	Magdalena	10 25	138 49
Cumberland Island	19 18	148 36	Easter Island	27 08	109 52
Gloucester Island	19 11	140 04	Felix and Amb	27 38	79 45
Q. Charlotte's Island	19 18	138 04	Massafuero	33 45	80 36
Egmont Island	19 20	138 30	Juan Fernandez	34 20	078 56
Whitsunday Island	19 26	137 56	Galepagos Isle I. Albermale	00 02N	91 30
Lagoon Island	18 47	139 28			

THE END.

40.28
36.58
3.30

74.01
76.17

23=7
34.29
54.36

40.28 - - - 74.01
36.58 76-11

3956

1-24
1-25
55-6
60
5-6
5-6
2
36

136=3½
71=1½
207=5
60

460
41
126.33
113.10
32
243

85.92
13066

2-16-
6.0
1-3

74 01
71-17
2 44
60
120
40
15) 160 (10
15
11

3-30—
60
2

Phillips Library
3 6234 00116403 0

60/300
5 00

35 11
5 00

[illegible]

2 7 9 2
4 6 1

3 8 - 4 4
3 7 5 1
5 3

71-17
1716
241
62
144

8
4 41-27
6 55
6 6
3 6
3 9

Oliver Garth 41 29
40-41

19
29
48

41-49
40 41
1.08-22
60=